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# PACIFIC NORTHWEST (BONNEVILLE) CALIFORNIA INTERTIE

## MEMORANDUM OF THE CHAIRMAN

TO THE

## COMMITTEE ON INTERIOR AND INSULAR AFFAIRS

UNITED STATES SENATE

TRANSMITTING A

STUDY OF A HIGH VOLTAGE ELECTRICAL INTERCONNECTION BETWEEN THE PACIFIC NORTHWEST AND CALIFORNIA AND OTHER COMMUNICATIONS

MAY 3, 1960

Printed for the use of the Committee on Interior and Insular Affairs

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## MEMORANDUM OF TRANSMITTAL

To: Members of the Committee on Interior and Insular Affairs.
From: James E. Murray, chairman.
Subject: Pacific Northwest (Bonneville)-California intertie.

At the request of Senator Jackson, a member of the committee, a hearing is called for Thursday, May 5 at 10 a.m., in room 3110, New Senate Office Building, to consider the various communications in connection with the above subject.

This question arises from the committee resolution of May 19, 1959, under which the Secretary of the Interior was requested to suspend all negotiations looking to the sale of surplus Bonneville power or energy to California. A report was requested from the Department, which was received on February 17, 1960.

Subsequently, Governor Brown of California advised that his State had retained a consultant to review the proposals, particularly with respect to a high voltage interconnection between the Pacific Northwest and California.

The Department of the Interior on March 29 advised that the Pacific Gas & Electric Co. had offered to purchase about $1,800,000 of secondary energy annually from the Bonneville Power Administration on a temporary basis "without any implication of a future obligation of any kind."

There have been some questions raised as to the various phases of the proposal which require clarification.

A committee print of the information officially provided the committee, will be available before the hearing scheduled for May 5.

Under the circumstances, the chairman feels that the material submitted to the committee should be the subject of an open hearing so that all views could be aired and full disclosures made of all phases of the controversy.

For the information of the committee in connection with the hearing on May 5, 1960, at 10 a.m., in room 3110, New Senate Office Building, the attached material is submitted:

1. Letter of April 14 from Senator Jackson requesting hearing on intertie.

2. Letter from the Department of the Interior dated February 17, 1960, transmitting copies of a study of a high voltage interconnection between the Pacific Northwest and California (with detailed tabulations omitted). (Tables are in the committee files.)

3. Letter of April 18 to Senator Jackson announcing hearing on intertie.

4. Letter requesting comments of the Federal Power Commission on Interior Department's report of February 17, 1960, and reply thereof.

5. Request and reply from Comptroller General regarding Interior Department's report of February 17, 1960.

6. Comments of Senator Engle of California.

7. Copy of news release of Department of the Interior relating to proposal of Pacific Gas & Electric Co. with copy of P.G. & E. proposal of March 14, 1960.

8. Letter of March 23 from Governor Brown of California, relating to study of high voltage transmission line between Pacific Northwest and California.

9. Chairman Murray's response to Governor Brown—letter dated April 18.

10. Chairman Murray's response to Secretary Seaton of the Department of the Interior.

11. Letter from Chairman Murray to Senator Engle.

12. Night letter from Gus Norwood, Northwest Public Power Association, opposing Interior's proposal.

13. Resolution adopted by Committee on Interior and Insular Affairs on May 19, 1959.

JAMES E. MURRAY, *Chairman.*

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[1] Included in the submitted report but on file with the committee.

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# PACIFIC NORTHWEST (BONNEVILLE)-CALIFORNIA INTERTIE AND OTHER COMMUNICATIONS

## LETTER FROM SENATOR JACKSON TO SENATOR MURRAY REQUESTING A HEARING

U.S. SENATE,
COMMITTEE ON ARMED SERVICES,
*April 14, 1960.*

Hon. JAMES E. MURRAY,
*Chairman, Committee on Interior and Insular Affairs,*
*U.S. Senate, Washington, D.C.*

DEAR MR. CHAIRMAN: At the meeting of the full committee on April 1 there was discussion of the letter from Assistant Secretary of the Interior Aandahl, dated March 28, concerning the proposal of the Pacific Gas & Electric Co. to purchase power from the Bonneville Power Administration.

The committee decided to defer further discussion of the matter until a report requested from the General Accounting Office was received. The consensus was that after receipt of this report the committee would take testimony from departmental witnesses and other interested parties on the details of the proposal.

It is my understanding that the GAO report has now been received. Therefore, I respectfully request that a hearing be scheduled so the committee will have the opportunity to hear comments on the proposal and develop further facts.

I have been advised that witnesses from the Pacific Northwest would be available on May 5. Therefore, that date is suggested should it prove acceptable to the committee and convenient for other witnesses.

Sincerely yours,

HENRY M. JACKSON.

## SUBMISSION OF REPORT FROM THE DEPARTMENT OF THE INTERIOR

U.S. DEPARTMENT OF THE INTERIOR,
OFFICE OF THE SECRETARY,
*Washington, D.C., February 17, 1960.*

Hon. JAMES E. MURRAY,
*Chairman, Committee on Interior and Insular Affairs,*
*U.S. Senate, Washington, D.C.*

DEAR SENATOR MURRAY: Enclosed are copies of a study of a high-voltage interconnection between the Pacific Northwest and California which was prepared in response to a resolution adopted on May 19, 1959, by the Senate Committee on Interior and Insular Affairs.

On December 23, 1959, we advised you that a preliminary draft of the study was being submitted to the consultation group, as mentioned in the resolution, for review. Comments of the consultation group have been incorporated in the body of the report, where practicable, and the complete set of written comments of the group are included as an appendix.

We are also transmitting copies of the minutes of the meeting of the subcommittee of the consultation committee which was held on January 25, 1960. This meeting was held in order to give the consultation committee an opportunity to review all comments submitted on the draft report.

In transmitting this study we wish to clarify the concluding sentence on page 35. Under the contractual arrangements for coordination and wheeling now in force with the Pacific Gas & Electric Co., which expire in 1971, and under the arrangements in force between 1951 and 1959, the capacity could be provided on the Bureau of Reclamation's system by mutual agreement with the company. Should it be in the overall interest of the Government to proceed without agreement, the contractual arrangements with Pacific Gas & Electric Co. provide for a 3-year termination period during which the Government would, of course, have to make new transmission arrangements, including arrangements for delivery of power to the Government's customers in lieu of the wheeling service now provided by the company.

Sincerely yours,

FRED G. AANDAHL,
*Assistant Secretary of the Interior.*

# STUDY OF A HIGH VOLTAGE ELECTRICAL INTERCONNECTION BETWEEN THE PACIFIC NORTHWEST AND CALIFORNIA *

Submitted to the Senate Committee on Interior and Insular Affairs by Fred A. Seaton, Secretary of the Department of the Interior, in response to a resolution adopted by the Senate committee on May 19, 1959

## MEMORANDUM FROM ADMINISTRATOR, BONNEVILLE POWER ADMINISTRATION, TO SECRETARY OF THE INTERIOR

Subject: Pacific Northwest-California intertie.

We are submitting a study of a high-voltage electrical interconnection between the Pacific Northwest and California, made in response to your request pursuant to the resolution of the Senate Committee on Interior and Insular Affairs dated May 19, 1959.

In accordance with the resolution, individuals representing the Governors of the States involved and other interested groups mentioned in the Senate resolution met in Portland, Oreg., on June 25, 1959. At that meeting, it was agreed that a subcommittee should perform the detailed work of consultation with the Bonneville Power Administration and the Bureau of Reclamation. A subcommittee was elected by the constituent groups and met on July 23, 1959, to consider an outline of procedure prepared by the Bonneville Power Administration, the Bureau of Reclamation, and the Federal Power Commission. After review by the subcommittee, a revised outline was prepared and mailed to the subcommittee members on August 6, 1959. The study has progressed in accordance with the outline of procedure which established the assumptions used.

A draft report was submitted to the subcommittee of the consultation committee for review on December 22, 1959. Each subcommittee member was given the number of copies he desired and each consulted with his own group to review the draft. Written comments were prepared and submitted to the Bonneville Power Administration. These comments in turn were distributed to all subcommittee members and were discussed at a meeting held on January 25, 1960.

Following this meeting, the report was revised and the attached study was prepared. The Bureau of Reclamation and the Bonneville Power Administration agree upon this report. Written comments submitted by the consultation committee are included as an appendix.

In carrying out the study and analysis requested in the resolution, related incidental studies were made to provide full information upon which to base the conclusions and recommendations. Procedures and assumptions used for this study are included and explained in the report. The resolution stipulates that the study relate to an inter-

*Prepared by Bonneville Power Administration in cooperation with the Bureau of Reclamation and in consultation with interested parties in the Pacific Northwest and California, February 1960.

connection for disposal of surplus secondary energy between the Federal power systems in the Pacific Northwest and California.

The study shows that little or no benefits result from the coordination of the Federal surplus secondary energy in the Pacific Northwest and the Central Valley system in northern California. If the reservoirs of the two Federal systems were operated as one and were fully coordinated, a block of additional firm power would result. However, the report indicates that such coordination would utilize some of the high availability secondary energy and the provisional power (advance withdrawal of energy from storage on a repayable basis) now marketed in the Pacific Northwest. The studies on the feasibility of a high voltage interconnection assume that the term "surplus secondary energy" means energy surplus to the present and future needs of the Pacific Northwest.

The study indicates feasibility of an interconnection for the sale of surplus secondary energy in California. In this case, financial feasibility is a matter of the savings resulting from not operating a steam generating unit compared to the cost of hydro secondary energy purchased to displace it. The study analyzes the future availability of this surplus secondary. This surplus secondary energy could be sold at delivery points in Oregon for use in Californian markets in the same manner as the Bonneville Power Administration now markets this type of surplus energy for use in Idaho, Montana, and British Columbia. Average revenue to the Bonneville Power Administration for sale of surplus secondary energy for the first 10 years of a 230 kilovolt Pacific Northwest-California interconnection with a capacity of 200,000 kilowatts would be about $1,800,000 a year.

The Senate resolution indicates that the study and analysis should examine both feasibility and desirability of an interconnection. The desirability is discussed as an incident to other factors listed for study by the resolution.

WILLIAM A. PEARL, *Administrator.*

# STUDY OF A HIGH VOLTAGE ELECTRICAL INTERCONNECTION BETWEEN THE PACIFIC NORTHWEST AND CALIFORNIA

## SUMMARY AND CONCLUSIONS

*Introduction*

During the past few years, the Bonneville Power Administration has considered possible markets for its surplus secondary energy. In an extremely wet year, this secondary energy surplus to the needs of the Pacific Northwest could amount to as much as 25 billion kilowatt-hours based on current installations and loads. Possible additional sales in the Pacific Northwest were investigated, including the feasiblility of selling secondary energy to displace fuel in new non-Federal thermal-electric plants, but no other large new markets for this surplus secondary energy appeared likely to develop within the next 10 years.

The Bonneville Power Administration sells surplus secondary energy for use in Idaho, Montana, and British Columbia as well as in Oregon and Washington. A brief study disclosed a potential market for use in steam displacement in northern California. In January 1959, two officials of the Bonneville Power Administration met with officials of the Pacific Gas & Electric Co. relative to a sale of secondary energy surplus to the needs of the Pacific Northwest for steam displacement in this company's service area. The discussions covered terms of a contract for sale of energy surplus to the needs of the Northwest including construction of a 230,000-volt interconnection by the California Oregon Power Co. from Klamath Falls to the Oregon-California State line and the Pacific Gas & Electric Co. from the State line to pit No. 3. When results of the studies were made known, questions were raised by various groups relative to the interconnection.

As a result of the public interest in the proposed sale, the Subcommittee on Irrigation and Reclamation of the Senate Committee on Interior and Insular Affairs held hearings on April 8 and 9, 1959, relative to a high-voltage intertie between the Pacific Northwest and California for the purpose of disposal of secondary energy surplus to the needs of the Pacific Northwest. At the conclusion of the hearings, the Senate committee adopted a resolution, a copy of which follows this section, asking the Secretary of the Interior to direct the Bonneville Power Administration, in cooperation with the Bureau of Reclamation, to conduct a study of an intertie. The chapters of this report are numbered to correspond with the eight directives in the resolution of the Senate Committee. Some of the factors involved in each directive and the conclusions are summarized in the following:

*1. Loads and resources*

Load levels for the Pacific Northwest for 1970 and subsequent periods were taken as the maximum estimates of the Corps of Engi-

neers report entitled "Water Resource Development of the Columbia River Basin" and dated June 1958. These are the load estimates that interested parties in the Pacific Northwest agreed to use for all planning purposes. However, to further appraise the economic and financial feasibility of some of the transmission plans considered to provide a high-voltage interconnection, the study was analyzed using the minimum load estimates of the Corps of Engineers report. Although the benefit-cost ratios increased, no difference was found with respect to the economic or financial feasibility of any individual transmission plan and, of course, no difference in the order of economy of the various plans discussed.

In analyzing resources, a set of projects to meet the loads was assumed. Again, heavy reliance was placed on the above-mentioned Corps of Engineers report and, due to the limited time available, sequences that had been analyzed for other purposes generally guided the assumptions as to the availability of various projects. Since Mountain Sheep or its alternative, Pleasant Valley, had not been previously analyzed for early development, neither was included in the 1968–69 resources. An abbreviated analysis of the effect of adding their project was made, but it increased secondary availability only a small amount and, therefore, would not materially change the benefit-cost ratio of any plan.

Potential markets in California for surplus secondary energy from the Pacific Northwest were investigated. On the assumption that any secondary energy that could be utilized in the Pacific Northwest would be used there rather than exported to California and that provisional energy (advance withdrawal of storage on a repayable basis) would continue to be reserved for interruptible industrial loads in the Pacific Northwest, the market in California becomes limited to that of steam displacement since thermal-generating plants would have to be available to carry the load on a firm basis.

Possibilities of marketing surplus power in southern California were also examined. Since incremental peak losses from the Bonneville system to the Bakersfield, Calif., area were about 40 percent, this market would be limited to emergency service where cost would not be controlling.

*2. Coordination*

Studies of coordinated operation of the Central Valley project and the U.S. Columbia River power system were made on two bases: (1) utilizing only secondary energy that is surplus to the needs of the Pacific Northwest, and (2) hydraulic operations of the two systems as one coordinated system, disregarding existing commitments and contracts. On the basis of first supplying all secondary energy needs in the Pacific Northwest, no additional firm power was created by coordination. However, with coordinated hydraulic operation disregarding existing commitments, the average critical period capability of the two systems would be increased by about 500,000 kilowatts compared with isolated operation. There is some question as to the practicality of such coordination, since to provide the same dependable capacity to the Central Valley project that it now receives from its contract with Pacific Gas & Electric Co., most of this additional critical period energy would have to be allocated to the Central Valley

project. Although some additional firm power under this assumption would be available to the Pacific Northwest, it would be small compared with secondary energy loads. Furthermore, such coordination and division of critical period energy would deprive industrial operations in the area of some of the high availability interruptible power supplies and the provisional power upon which they now depend. Industrial facilities, which include 9 percent of the Nation's aluminum reduction capacity, requiring about 450,000 kilowatts and representing a plant investment of about $100 million, depends upon such interruptible and provisional power supplies from the U.S. Columbia River power system. Furthermore, these coordination benefits would decrease in the future as additional hydroelectric installations in the Pacific Northwest reduce the diversities between the two systems. Therefore, in analysis of the feasibility of an interconnection, only secondary energy surplus to the needs of the Pacific Northwest has been considered.

*3. National defense*

A Pacific Northwest-California intertie has value from a national defense standpoint, but no separate monetary evaluation of this function has been made. Up to the capacity of the intertie and availability of resources, one area could assist the other in case of an emergency.

*4. Economic feasibility*

Since there were no firm power benefits resulting from coordination of excess secondary energy with hydro of the Central Valley project, economic feasibility was determined by comparing the savings in backing off of thermal-electric generating plants in the San Francisco Bay area with the incremental transmission costs, disregarding ownership of existing facilities. Annual costs were based on Federal financing and on a 10-year and a 25-year amortization period. Two 230-kilovolt circuits were found to be economically feasible, based on the assumptions of the report. Higher voltage circuits are not economically feasible and the incremental benefits from such circuits are small compared with the incremental costs. Appendix charts I and II summarize the economic feasibility of the various plans presented.

*5. Conservation*

Fuel in the northern California area could be saved by importation of surplus secondary energy from the Pacific Northwest. Such savings would be limited by minimum fuel purchases under contracts and commitments in California which are essential in order to assure a fuel supply for all years. Such an interconnection would enable the U.S. Columbia River power system to utilize to a better advantage its hydroelectric resources which are a renewable resource compared with fossil fuels which are exhaustible.

*6. Rights of preference customers*

The regional solicitor's opinion indicates that preference customers in either the Pacific Northwest or California would have priority in the purchase of both firm and secondary energy over nonpreference customers in either area.

*7. Costs*

A 230-kilovolt circuit with capacity of 200,000 kilowatts built from Klamath Falls to pit No. 3 would require an investment of about $5,800,000 and annual charges based on Federal financing and a 10-year amortization period of about $700,000. A second 230-kilovolt circuit from Redmond, Oreg., to Butt Valley in California would require an additional investment of $11,800,000 and annual charges of about $1,500,000.

A 230-kilovolt circuit from Yamsay, Oreg., to Keswick, Calif., an alternate which would directly connect the U.S. Columbia River power system and Central Valley, would require an investment of $10,800,000 and annual charges of nearly $1,300,000.

*8. Financial feasibility*

Although two 230-kilovolt circuits are economically feasible under the assumptions of this report, only one 230-kilovolt line is financially feasible on the basis that the Bonneville Power Administration sells the surplus secondary energy at its established rates within its service area. Under these assumptions, an interconnection with the Pacific Gas & Electric system would be more economical than with the Central Valley project. Pacific Gas & Electric can reregulate its hydroelectric plants so existing transmission facilities could be utilized to transmit the power to the San Francisco Bay area, and also the transmission distance to pit No. 3 of the Pacific Gas & Electric system is shorter than to the Keswick plant of the Bureau of Reclamation.

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**RESOLUTION RECOMMENDED BY THE SUBCOMMITTEE ON IRRIGATION AND RECLAMATION, MAY 11, 1959**

*Resolved*, That the Committee on Interior and Insular Affairs request:

(*a*) That the Secretary of the Interior direct the Bonneville Power Administration to conduct, in cooperation with the Bureau of Reclamation, a study and analysis of the feasibility and desirability of a high-voltage interconnection for disposal of surplus secondary energy between the Federal power systems in the Pacific Northwest and California and report to the Congress thereon, together with conclusions and recommendations not later than July 15, 1959;

(*b*) That this study and analysis include consultation with the Governors of the States of California, Oregon, Washington, Idaho, and Montana, with the Federal Power Commission and representatives designated by the Pacific Northwest Power Pool, as well as organizations representing public and private utilities in California; and

(*c*) That, among other factors, this study and analysis shall include:

(1) All presently foreseeable power loads and resources, both public and private, in the two regions;

(2) The best interests of all Federal agencies in the two regions, both at present and in the foreseeable future, including increases in the firm power capability of the two systems directly affected;

(3) The national defense aspects of such an interconnection;

(4) The maximum voltage economically feasible for such an interconnection, both initially and ultimately;

(5) The conservation and maximum utilization of both fossil fuel and hydroelectric resources in the two regions;

(6) The effect, if any, that the proposed interconnection would have on the geographical extent of the Bonneville Power Administration service area and the effect, if any, on the rights of preference customers and other customers within the service area to require power from the Bonneville system;

(7) Estimates of construction and operation and maintenance costs involved in any interconnection; and

(8) All other financial aspects involved in the several phases outlined in this resolution;

*Be it further resolved*, That the committee request the Secretary of the Interior to suspend all negotiations for any interconnection or sale of surplus power until the Congress has had the opportunity to consider and act on the study and analysis requested by this resolution.

SENATE COMMITTEE ON INTERIOR AND INSULAR AFFAIRS.
By: JAMES E. MURRAY, *Chairman*.

Adopted: May 19, 1959.

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## I. ELECTRIC POWER AND ENERGY LOADS AND RESOURCES

Directive No. 1 of the Senate committee resolution asks the Bonneville Power Administration and the Bureau of Reclamation to examine "all presently foreseeable powerloads and resources, both public and private, in the two regions." By "presently foreseeable" the resolution has been interpreted to mean through the year 1985.

To report adequately on electric power and energy loads and resources of the Pacific Northwest and northern California, the two regions directly affected by an intertie, it is necessary to consider the other areas with which these two regions are electrically interconnected. The Pacific Northwest and northern California are presently interconnected with two small capacity tielines through the California Oregon Power Co. system. Northern California is interconnected with southern California. The Pacific Northwest is interconnected on the north with southwestern British Columbia and on the east with central Montana and Utah. Central Montana is in turn interconnected with Wyoming and Colorado and on occasion with areas to the east of it. To reduce the problem at hand to workable proportions, therefore, interconnections of the Pacific Northwest with areas to the north and east are discussed only briefly, and quantitative data are given principally for the Pacific Northwest and California.

Because of the vast geographical area and the number of utility systems to be considered, it was necessary to estimate loads and resources principally from available data. The Pacific Northwest and California combined will have a peakload of about 20 million kilowatts in December 1960, of which about one-half will be in the Pacific Northwest, about one-fourth in northern California and the service area of the California Oregon Power Co., and the remaining one-fourth in southern California. In addition to the vast geographic area, all levels of development through the year 1985 and all varieties of streamflow which have been experienced must be considered. For the Pacific Northwest, estimates of electric power capability and loads

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assembled by the Corps of Engineers for the Columbia River review report of June 1958 (308 report) and for studies requested by the international joint commission were used for the greater part of the period through 1985. These are the electric load estimates agreed upon for use in planning by Pacific Northwest agencies. Initial power capability for the Pacific Northwest was estimated from studies previously made by Bonneville Power Administration. Powerloads and capabilities for California were supplied by the regional engineer of the Federal Power Commission, who acted as liaison with a committee representing the State of California and the utilities in both northern and southern California and who also obtained similar data for the California-Oregon Power Co. The hydroelectric development to be assumed at the various load levels in the Pacific Northwest was defined by a committee made up of representatives of the Federal agencies involved with power generation in the region, under the guidance of the subcommittee of the consultation committee.

## PACIFIC NORTHWEST

The Pacific Northwest is defined for this report as the States of Oregon, Washington, Idaho, and Montana west of the Continental Divide, less the areas served by California Oregon Power Co. and Utah Power & Light Co. This area is served through a transmission grid operated by the Bonneville Power Administration and others, which has the physical capacity to effect essentially fully coordinated operation. The coordinated operation which is presently in effect is largely voluntary and on a nonfirm basis through the Northwest Power Pool. Installed generating capacity in the Pacific Northwest on June 30, 1959, was 9,746,000 kilowatts. Bonneville Power Administration is the agency charged with transmitting and marketing power generated at 17 of the Federal projects in the Pacific Northwest. Power from Federal projects in southern Idaho is marketed by the Bureau of Reclamation.

*Loads*

Pacific Northwest load estimates used in this study for the period 1960 through 1985 are summarized as follows:

| | December peak (megawatts) | Annual energy (millions of kilowatt-hours) |
|---|---|---|
| Actual, 1955 | 7,310 | 41,617 |
| Estimated: | | |
| 1960 | 9,732 | 57,868 |
| 1965 | 13,379 | 81,912 |
| 1970 | 18,365 | 113,806 |
| 1975 | 22,830 | 141,549 |
| 1980 | 27,443 | 169,445 |
| 1985 | 32,931 | 202,850 |

Estimated peak loads and average energy requirements are summarized by months and by 5-year intervals in appendix table 1.[1] All these loads include losses so that they can be compared with generation.

[1] All tables referred to in this report are filed with the committee.

Load estimates used in this study, with the exception of the 1960 estimate which is the current estimate of the utilities in the region, are based on the forecasts prepared for the Columbia River Review Report published in June 1958. The review report presented a series of three estimates—a high, an average, and a low estimate—through 1985, by 5-year intervals. In this study, the "average" estimate was used for the 1965 level of development and the "high" estimate for 1970 and subsequent years. As a result of the 1957–58 recession, the "high" estimate for 1965 did not appear reasonable, but it appeared possible to reach the "high" estimate by 1970. Estimates for intervening years were obtained by interpolation.

Included in the load estimates were detailed studies of nine high load factor electroprocess industries, prepared for favorable, average, and unfavorable conditions. The range in these estimates accounted for most of the range between the high and low estimates of total regional load. Appendix table 2 shows all three estimates of industrial load.

The high estimates adopted for use in this study exceed current estimates of power distributors in the Pacific Northwest region because of the inclusion of new large industrial loads. This is to be expected because current load forecasts do not include large potential loads until they are secured by contract and can be specifically located for planning of needed facilities. However, it has been agreed by interested parties in the Pacific Northwest that the high estimates be used for general planning purposes, which would include studies such as this. In selecting the high estimate for planning purposes, it was generally recognized that if a load is not reached in the specified year, it is expected to be reached shortly afterward, since loads are expected to continue to grow rapidly.

The estimated distribution of the area load between preference and nonpreference customers is shown in appendix table 3. It was assumed, for purposes of this report, that both public and private agencies would grow at the same rates and that they would serve the same proportion of the total regional load as they do at present.

*Resources*

As it was necessary to use power capability studies which had already been prepared, the basic assumptions for the studies were not established specifically for this report. All the studies are based on the 240 months of historical streamflow from July 1928 through June 1948. All system regulation studies assume fully coordinated operation within the Pacific Northwest.

*1960–61 system.*—The 1960–61 Pacific Northwest power system consists of the projects which, under present generator installation schedules, will be available by that date.

The average annual capability of the 1960–61 system is 7,866,000 kilowatts. For the critical storage release period, the average hydroelectric capability of the Pacific Northwest is estimated to be 6,342,000 kilowatts. The excess of energy capability over that available in the critical period could be used for interruptible loads, steam displacement, or reservoir storage.

*1968–69 system.*—The 1968–69 system consists of the projects which are existing and under construction plus the large main stem run-of-river projects available for early development. These are Boundary,

Wells, Hells Canyon project of the Idaho Power Co., lower Granite, Little Goose, and lower Monumental. The selection was intended to represent a compromise between optimistic early development of storage and a conservative Federal construction program which would avoid annual appropriations from Congress substantially in excess of those recently provided. Although no new storage is included in this system, it is rather optimistically assumed that all projects on the lower Snake River would be available by 1968–69.

The average annual capability of the 1968–69 system is 12,581,000 kilowatts. As no new storage was added with this system, the critical storage release season of 1936–37 does not change. The averag- hydroelectric capability of the Pacific Northwest during this critical season is estimated at 9,935,000 kilowatts.

In view of the possibility that high Mountain Sheep or an alternative at the Pleasant Valley site might be added to the system by 1968–69, the prime power increment was examined. High Mountain Sheep as now proposed by the Pacific Northwest Power Co. would provide 1,800,000 acre-feet of usable storage at optimum drawdown and a generator installation with a maximum overload rating of about 1 million kilowatts. Over the critical storage release season, which is the same as for the 1960–61 system, the project would add 945,000 kilowatts of average capability to the 1968–69 system, of which 226,000 kilowatts would be generated at downstream plants. In storage release seasons other than critical, less energy would be added. When the storage is refilled, secondary energy generation of the system would be reduced. Much of this reduction would occur in months which have maximum secondary energy, but some reduction would occur in months when all secondary energy is usable.

*1977–78 system.*—The 1977–78 system as presented in this report results from a desire to examine a system roughly midway between the 1968–69 system and the systems chosen for 1984–85. It appears that this should consist of substantially full run-of-river development of the main stem plus about three major storage projects. As no such system had previously been studied for the full 240 months, a system containing Libby, Bruces Eddy, high Mountain Sheep (or Pleasant Valley as an alternate), and Mica projects was defined for this purpose. Mica was then dropped from the study without reoperation, which provided an alternative set of resources.

The average annual capability of the 1977–78 system is 16,086,000 kilowatts with Mica and 15,617,000 kilowatts without Mica. With Mica the critical period is extended to the 42 months of September 1928 to February 1932, over which the average hydroelectric capability of the Pacific Northwest is estimated at 13,631,000 kilowatts. Without Mica, the critical storage control period is August 1936 through April 1937, over which the average hydroelectric capability is estimated at 12,286,000 kilowatts.

Mica project, by firming up secondary through storage, adds 1,345,000 kilowatts of critical period average generating capability in the Pacific Northwest under the assumed 1977–78 development. It should be noted that not all of this capability may be available for meeting Pacific Northwest loads. Part of this capability could be allocated to Canada. As the method of allocation is currently under consideration by the International Joint Commission, it is impossible to determine the portion which would be available to the region. For

the purpose of illustration herein, the capability is treated as though it were entirely a Pacific Northwest resource.

*1984–85 system.*—The 1984–85 system used in this report is the major water plan studied by the Corps of Engineers in its Columbia River Review Report of June 1958 except that high Mountain Sheep project (or Pleasant Valley as an alternate) was substituted for Nez Perce. As for 1977–78, the system was studied with and without the Mica project.

The average annual capability of the 1984–85 system is 17,277,000 kilowatts with Mica and 17,087,000 kilowatts without Mica. The critical storage control period energy capability is raised by addition of Mica reservoir from 14,544,000 kilowatts to 14,916,000 kilowatts. As with the 1977–78 system, some of this increase in capability could be allocated to Canada, but for illustration herein is shown as a Pacific Northwest resource.

*Comparison of loads and resources*

Loads and resources of the Pacific Northwest have been compared at each of the four levels of development for which estimates of resources were made. The results of these comparisons are shown on appendix tables 4 through 9. The tables indicate the hydro energy surplus or deficit for the region for each of the 249 months of streamflow. The tables are the result of a direct subtraction of load from hydroelectric and nuclear capability. Positive values therefore indicate the hydro energy surplus which is available for additional loads in the Pacific Northwest or for export. Negative values indicate an energy deficit which, under the load and resource conditions that are anticipated, would be met from thermal-electric sources or by curtailment of interruptible industrial load. As transmission losses are included in the load estimates, the values on the tables indicate surpluses measured at the generator. As delivered to a user, the surplus would be less by the amount of transmission loss.

The deficiencies shown on the tables are before use of any of the region's thermal resources except the convertible nuclear reactor under investigation at Hanford. As the reactor would be operated initially for plutonium production with power as a byproduct, it could generate power at all times, even when there is a surplus of hydro energy. In the later years, thermal power is needed essentially all the time. For the tables it was therefore assumed that an energy supply would be provided by Hanford of 480,000 kilowatts in 1968–69 and 720,000 kilowatts in 1977–78 and 1984–85.

At the bottom of each of the tables which show energy surpluses and deficits, the surpluses available for export under stated transmission capacities are shown. These quantities are the averages for each of the 12 months of the surpluses only, disregarding the deficits.

To provide a comparison of loads and resources for years other then the four studied, charts III, IV, and V were prepared. As the 4 individual years of study show a change from a surplus energy situation at present to a situation prior to 1985 in which virtually all hydro energy is usable in the Pacific Northwest, it becomes desirable to ascertain the timing with which this change will take place. With only 4 years available for plotting, this timing can, of course, be determined only in a very rudimentary manner. It should also be emphasized that this timing is very closely dependent upon the

load estimate and upon the construction timing of the projects which are assumed to be added to the hydroelectric system.

### NORTHERN CALIFORNIA

Northern California, for purposes of this report, closely approximates the area designated by the Federal Power Commission as power supply area 46. It includes all of northern California exclusive of the three counties which border Oregon and extends southward to the Tehachapi Mountains including the northern portion of Santa Barbara County but excluding Mono and Inyo Counties. Portions of Kings, Kern, and Tulara Counties which are part of Southern California Edison Co.'s San Joaquin Valley Division are also excluded. The area also includes the portion of Nevada served by the Sierra Pacific Power Co.

The bulk of the northern California area is served by the Pacific Gas & Electric Co. As a result of wholesale power sales contracts and transmission interconnections between the company and other power producers of the area, power operations in the area are highly coordinated. The company is furthermore interconnected in the south with Southern California Edison Co. and in the north with California Oregon Power Co.

*Loads*

The estimated power requirements for northern California are shown in appendix tables 10 through 13. The tables show peak and energy requirements by months for forecast years at 5-year intervals ending with 1985. To provide data both on publicly and privately owned utilities, loads are given for four major categories as follows: (1) private, (2) resale municipals, which are municipal systems that sell at retail and secure all of their power supply from private sources, (3) public agencies with generation, and (4) project pumping.

Public agencies having their own generation or purchasing their requirements from the Central Valley project rely either directly or indirectly upon Pacific Gas & Electric Co., to firm their generation or purchases and to furnish reserve generating capacity.

*Resources*

The estimated power resources for northern California are shown shown in appendix tables 14 through 19. The resources shown comprise existing sources of power and future hydroelectric sources which appear practicable for construction, as complemented by necessary additional thermal-electric resources. The thermal resources provide required minimum reserves of both energy and capacity in dry years, after necessary outages for maintenance. The tables segregate hydro resources by private utilities and public agencies and segregate thermal resources into the amount required for load, for maintenance outages, and for reserves. Resources are shown for average, wet, and dry year streamflow conditions.

### SOUTHERN CALIFORNIA

Southern California, for purposes of this report, approximates the area designated by the Federal Power Commission as power supply

area 47. It consists of all of California south of the area described in this report as northern California except for the eastern portion of San Bernardino and Riverside Counties. It also includes the Nevada counties of Esmeralda and Nye, and a part of Mineral County. Although the Metropolitan Water District's area is considered to be a part of power supply area 48, its power requirements have been included in the southern California load. Southern California Edison Co. serves a substantial part of the area. Approximately one-third of the total regional load is carried by public agencies, of which the Los Angeles Department of Water and Power is the largest. Interchange of information for coordination is accomplished through the Pacific Southwest Power Interchange Committee. The region is the principal user of power from the Bureau of Reclamation's Colorado River system, which includes powerplants at Hoover, Davis, and Parker Dams.

*Loads*

The estimated power requirements for southern California are shown in appendix tables 20 and 21. Peak and energy requirements are shown by months for forecast years at 5-year intervals ending with 1985. Corresponding to estimates for northern California, loads are shown for the categories of private, resale municipals, and municipal utilities. However, in contrast with northern California, no distinction is made in the load estimate for dry, wet, and average water years, as powerloads in all water years are assumed the same for southern California.

*Resources*

Estimates of power resources for southern California are shown in appendix tables 22 through 25. The resources are segregated into privately and publicly owned. Resources are also shown for average and dry year streamflow conditions. The capability in a wet year is not materially larger than the average year capability because most of the hydro installations are at holdover storage reservoirs. The principal effect of a wet year is to reduce fuel plant loading in off-peak periods.

### CALIFORNIA-OREGON POWER CO. AREA

The Pacific Northwest and northern California are separated by the service area of the California-Oregon Power Co., commonly designated as COPCO. The area served by COPCO is the three northern counties of California and roughly Josephine, Jackson, Douglas, Klamath, and Lake Counties in Oregon. Essentially all the load in this area is served by COPCO, including the industrial load of Hanna Nickel Smelting Co. near Roseburg, Oreg., which is served for the Bonneville Power Administration on a replacement basis. This replacement and others are effected by segregating a portion of the COPCO load for service by BPA at certain times.

COPCO is interconnected with Bonneville Power Administration at its Yamsay and Cottage Grove substantions and with Pacific Gas & Electric Co. at Delta substation. These interconnections are operated so as to effect interchange between COPCO and BPA and between COPCO and P.G. & E. under existing contracts. Lack of transmission capacity is one factor preventing operations of the three systems in synchronism.

Load estimates for COPCO are shown in appendix tables 26 and 27. These tables show by months, for every fifth year of the period 1960 through 1985, estimates of peak and energy required by the area as segregated by private utilities and public agencies.

The private, or investor-owned, system requirements are those of California Oregon Power Co., while the public agency loads shown are the estimated loads of the city of Ashland and Surprise Valley Electrification Corp.

The total loads were estimated by COPCO, and the segregation of requirements of the two public agencies was obtained by assuming for these systems annual rates of growth and load factors for future years comparable to actual values for the past typical years 1955, 1957, and 1958. COPCO's firm commitments to Hanna Nickel under the present contract, which expires June 30, 1973, were disregarded since they had already been included in Pacific Northwest load estimates.

*Resources*

The estimated resources of COPCO are shown in appendix tables 28 and 29. Monthly data are given for every fifth year of the 1960–85 period to correspond with the load estimates on the preceding two tables.

The resources consist entirely of outputs of COPCO plants (existing or to be constructed) and other power available to the COPCO system. The resources thus include power from (1) the company's existing hydro plants; (2) future company hydro, steam, or nuclear plants; (3) purchases from local lumber companies and the USBR Green Springs project; (4) Bonneville Power Administration replacement (based upon a 50 percent increase over the demand furnished by the company to Hanna and Lookingglass); (5) 60,000 kilowatts from Pacific Gas & Electric Co., contract for the latter terminating July 30, 1964; and (6) other purchased power as required.

## SOUTHERN BRITISH COLUMBIA

The Province of British Columbia encompasses an area of over 366,000 square miles, but almost all of the present load is concentrated in a small area immediately north of the border in the Vancouver-Victoria area. Therefore, the current potential market in this area for surplus secondary energy available from the U.S. Columbia River power system is limited to the service areas of the British Columbia Power Commission and British Columbia Electric Co. Both of these utilities have load responsibilities on Vancouver Island interconnected to the mainland by underwater cable and on the mainland itself. The only interconnection between this area and the Pacific Northwest at the present time is a 230-kilovolt interconnection at Blaine, Wash., with a maximum interchange capacity of about 150,000 kilowatts.

Faster load growth than was anticipated and extremely low water conditions during the past several years in British Columbia have created serious problems for the B.C. Power Commission and the B.C. Electric Co. in meeting their total load requirements. During the past few years, surplus energy in the U.S. portion of the Pacific Northwest has been made available to these utilities to alleviate this situation. Earlier surpluses of the British Columbia Electric Co. were sent south over the Blaine interconnection to relieve a power shortage

in the United States. This type of cooperation is expected to continue in the future.

For the present, unresolved problems such as fish passage past high dams constructed to develop hydroelectric potential and the international problem of how to divide downstream benefits created in one country from storage developments in the other have temporarily delayed development of the hydroelectric potential in Canada. Development of the hydroelectric potential in Canada would permit carrying all the loads estimated to develop in British Columbia through about 1985. The British Columbia Electric Co. is installing thermal-electric generating plants to handle current load growth in its service area. A total of 680,000 kilowatts of steam-electric generation has been scheduled in addition to 50,000 kilowatts in two gas turbine units now in operation. This thermal generation creates a potential market for secondary energy surplus to the needs of the Pacific Northwest.

A third potential user in British Columbia is the West Kootenay Power & Light Co., which at present has no transmission interconnection with the Pacific Northwest system in the United States. However, one of its hydroelectric plants—Waneta, on the Pend Oreille River in Canada—uses storage releases from Hungry Horse, Flathead Lake, and Albeni Falls in the United States and, conversely, the Grand Coulee project and all other Columbia River projects downstream utilize storage releases from Kootenay Lake—controlled by the West Kootenay Power & Light Co. Under these conditions, an interconnection of sufficient size could create additional firm power benefits through coordination which could convert some secondary energy to firm power.

The combined present peakload in the Province amounts to about 1,425,000 kilowatts, with an average estimated load growth of between 7 and 8 percent through the next 25-year period. Generator installations presently available to serve load from the three major companies are as follows:

| | *Kilowatts* |
|---|---|
| British Columbia Electric Co.: | |
| Hydro | 762, 600 |
| Thermal | 50, 000 |
| Total | 812, 600 |
| British Columbia Power Commission (southern British Columbia only): | |
| Hydro | 310, 100 |
| Thermal | 94, 180 |
| Total | 404, 280 |
| West Kootenay Power & Light Co.: Hydro | 480, 780 |

These new projects, including the steamplants under construction, will serve the most immediate needs of British Columbia. Large developments, such as the upper Columbia and the Peace River, will provide necessary power for future growth. These developments can greatly affect U.S. operations.

### OTHER INTERCONNECTED AREAS

There are other power supply systems which are or may be interconnected with the Pacific Northwest in addition to California, COPCO, and southern British Columbia. These may have energy

exportable to the regions or may provide a market for Pacific Northwest secondary energy or, by exchange of energy, could have an important effect on power operations.

*Peace River*

A large hydroelectric development is at present under advance planning in the Peace River Basin of British Columbia. Storage would be sufficient for complete long-period control of the river including its principal tributaries, the Finlay and Parsnip Rivers. Although the power load for the Peace River is not yet defined, considerable capability would supposedly be made available to southwestern British Columbia, which is interconnected with the Pacific Northwest.

A high-capacity interconnection with the Pacific Northwest would provide a virtually unlimited firming effect physically available to the Columbia River system. Surplus secondary energy generated by the U.S. Columbia River power system in the summer and throughout wet years could in effect be stored in the Peace River Reservoir by displacement of British Columbia load. The effect of this coordination would be immediately to make the secondary energy of the Pacific Northwest available for serving firm load, although the increase in firm power might, of course, need to be shared with the entities supplying storage at Peace River. Studies to define the potentialities of this coordination have not been initiated.

*Utah Power & Light Co.*

Utah Power & Light Co. is interconnected with the Pacific Northwest. Interconnection is through the Idaho Power Co. at American Falls and Goshen substation near Idaho Falls and through the Montana Power Co. over an interconnection at Monida on the Montana-Idaho State line. Proposals have been investigated for interconnecting the Utah Power & Light Co. with public and private power systems in Wyoming, Colorado, New Mexico, Arizona, southern Nevada, and southern California through the transmission system to serve the Bureau of Reclamation's Colorado River storage project. Through the American Falls and Goshen interconnections, the Idaho Power Co. has secured a portion of its resources in the past. The interconnections are now used by Idaho Power Co. to dispose of its surplus energy both on a short-term firm basis and also seasonally to displace thermal generation in Utah. This displacement of thermal generation will undoubtedly continue; however, it has not been reflected in this analysis of Pacific Northwest loads and resources.

*Central Montana*

Central Montana is interconnected with the Pacific Northwest through facilities of Montana Power Co. The portion of the company's loads and resources west of the Continental Divide are in the Pacific Northwest. The company will, of course, operate its system for its own needs, with consequent power flows across the divide which are not reflected in this analysis for the Pacific Northwest.

Montana Power Co. is interconnected with the Wyoming system of Pacific Power & Light Co. The Wyoming system is in turn interconnected with the hydroelectric system of the Bureau of Reclamation in Wyoming, Colorado, and western Nebraska, and the Public Service Co. of Colorado. Proposals also have been investigated for inter-

connections from Wyoming and Colorado into Utah. The probable dependence of this area and central Montana on thermal-electric resources for additional power supply provides some possibility for the use of Pacific Northwest surplus secondary energy for fuel displacement.

Montana Power Co. is also interconnected in northern Montana with the northwestern part of the Bureau of Reclamation's Missouri River Basin system. The tie between the northwestern and eastern parts of the Missouri River Basin system is not at present strong enough to permit interconnected operation of the Pacific Northwest and the power systems of the Midwest. However, a stronger tie is under construction which may permit significant interchange of energy.

## II. COORDINATION BETWEEN THE POWER SYSTEMS OF THE BONNEVILLE POWER ADMINISTRATION AND THE CENTRAL VALLEY PROJECT

### INTRODUCTION

The second directive of the Senate resolution requires a study and analysis of the best interests of Federal agencies in the two regions, both at present and in the foreseeable future, including possible increases in the firm power capability of the two systems directly affected. The primary interests of each Federal agency such as irrigation, navigation, flood control, river regulation, and development of maximum system firm power must be given priority in any coordination studies undertaken. The coordination studies between the two Federal systems require blending of available secondary energy on each system together to create additional firm power. Accordingly, two major assumptions were made, one using only secondary energy surplus to all other area requirements and the other operating the two systems as a single system disregarding area requirements and contractual obligations.

### COMPARISON OF THE TWO FEDERAL SYSTEMS

The important differences in the elements and characteristics of the Central Valley project and the Columbia River system are the contrast in size, the water and storage relationship, power installations and character of the power requirements, and annual streamflow diversity.

*Size of the system*

On the basis of electric generator installations, the size of the two systems compares in a ratio of about 1 to 10, with the U.S. Columbia River system being the larger. This disparity, however, does not hold true between the respective Federal system reservoir storage capacities. With the addition of the Trinity River division, the Central Valley project will have an installed capacity of 1,009,800 kilowatts and use of some 7,300,000 acre-feet of storage as compared with an assumed installation in 1969 of 9,460,650 kilowatts and better than 10,600,000 acre-feet of storage in the U.S. Columbia River system, as illustrated in appendix table 30. The foregoing studies are based on the assumption that nonpower uses such as flood control, navigation, and irrigation have priority over power generation.

*Diversity of runoff*

The year of most adverse streamflow in the Central Valley project basin during the period analyzed is 1930–31, while in the Columbia River Basin under present level of development it is 1936–37. It is this annual diversity which indicates the possibility of achieving some gain in firm power capabilities through coordination of the two Federal systems.

Chart VI shows the comparative monthly runoff expressed in percent of annual for the median month year based on the 29-year period July 1925 through June 1954. The potential gains to be attained from the monthly diversity of runoff between the two regions is limited because of the priority of nonpower multipurpose uses.

*Power market characteristics*

The Central Valley project power is used first for project irrigation pumping needs, with the surplus being sold to public bodies, Federal agencies, and the Pacific Gas & Electric Co. Its operations are integrated with those of the Pacific Gas & Electric Co., with the company furnishing transmission service and exchanging energy to permit the use of all project generation for project pumping and sale as firm energy to its preference customers. Irrigation requirements in July and August create the peakload of the year. However, near peakload levels occur again during January and December.

The U.S. Columbia River power system is integrated with the electrical utility systems in the Pacific Northwest just as the Central Valley project system is linked with the utility systems in northern California. The load curve of the U.S. Columbia River system reflects the Northwest Power Pool requirements and has less monthly variation than in northern California. The peak months are November through February, with the annual peak normally occurring in January. From this peak, the load gradually declines to a minimum in late July or early August. Variation in streamflow, however, provides large blocks of potential secondary energy generation in excess of all other Pacific Northwest requirements which could be used for steam displacement in California or other adjacent areas. However, in July and August both the Central Valley project and the Columbia River system normally have maximum energy generation available.

## COORDINATION BY EXCHANGE OF SURPLUS ONLY

Based on load estimates used in these analyses and contracts and conditions existing and expected in each area, there are no firm power benefits from coordinating the two Federal systems by only exchanging energy, which is surplus to all firm and nonfirm requirements including interruptible industrial loads and steam replacement in each area. This is equally true for the conditions assumed for the 1968–69 load and resource level and for those conditions expected in subsequent years.

Although there are currently, and through 1970 there will continue to be, large amounts of secondary energy surplus to Pacific Northwest area needs on the U.S. Columbia River system, this surplus, based on streamflow records and estimated loads in the Pacific Northwest, would not be available during the critical streamflow periods of the Central Valley project.

## COORDINATED REOPERATION OF STORAGE

Operating the Central Valley project and the U.S. Columbia River system combined, as a single system for the initial 1968–69 level of development, increases the combined prime power over that which each could develop individually. This is possible because of their annual diversity in critical year streamflows. Should subsequent developments cause their critical periods to coincide, the increase in benefits indicated for the initial conditions would diminish.

This analysis does not give consideration to service by the Bonneville Power Administration of interruptible power or provisional power (advance withdrawal of energy from storage on a repayable basis) to industry or of steam displacement power to utilities in the Pacific Northwest. Moreover, this analysis does not give consideration to the contracts between the Bureau of Reclamation and Pacific Gas & Electric Co.

The following tabulation shows the estimated critical period energy capabilities for initial conditions from coordinating the two systems together under four low-water periods. The closeness of the combined energy capabilities of other low periods with the 1936–37 prime power suggest that any variation in operational procedure and plant characteristics or addition of new projects could cause the critical period to shift to other than that indicated for 1936–37.

*Estimated critical period energy with reoperation of storage, 1968–69 level of development*

[Thousands of average kilowatts]

| | Average critical period energy [1] | | |
|---|---|---|---|
| | U.S. Columbia River system | Central Valley project | Total the 2 Federal systems |
| Length of critical period: | | | |
| 7 months—Sept. 16–Apr. 15 (1936–37) | 5,626 | 652 | [2] 6,278 |
| 19½ months—October–Apr. 30 (1928–29), Sept. 16–Mar. 31 (1929–30), October–Mar. 31 (1930–31) | 5,973 | 320 | 6,293 |
| 12½ months—Sept. 16–Mar. 31 (1929–30), October–Mar. 31 (1930–31) | 5,951 | 380 | 6,331 |
| 24½ months—October–Apr. 30 (1928–29), Sept. 16–Mar. 31 (1929–30), October–Mar. 31 (1930–31), October–Feb. 28 (1931–32) | 6,023 | 299 | 6,322 |
| Gain in critical period energy: | | | |
| Coordinated operation | 5,626 | 652 | 6,278 |
| Isolated operation | 5,626 | [3] 150 | 5,776 |
| Gain | | | 502 |

[1] At generator.
[2] Nominal prime power.
[3] Energy for March 1930, meeting mandatory irrigation requirements.

From the foregoing tabulation it becomes evident that as a result of coordination, the combined critical period energy of the two systems is increased from 5,776,000 to 6,278,000 average kilowatts.

The gain from coordination should be divided equitably between the two regions. However, in order to illustrate the benefit and to compare it with existing conditions, it has been assumed that all of the increase would be available to the Central Valley project.

To maintain the combined systems' increased critical period energy capability, large blocks of secondary energy would be required from

the U.S. Columbia River system, particularly during the 3 low-water years of 1928–29, 1929–30, and 1930–31. The source of this energy and distribution by years is shown below.

*Energy required from the Columbia River system to maintain the combined systems' prime power*

[Thousands of kilowatt-hours]

| Year | Secondary energy from Columbia River system storage drawdown season | | | Total annual requirements |
|---|---|---|---|---|
| | From better water supply than 1936–37 | From additional Hungry Horse storage use | Refill summer months | |
| 1928–29 | 1,842,155 | 309,155 | 657,730 | 2,809,040 |
| 1929–30 | 989,515 | 451,505 | 749,710 | 2,190,730 |
| 1930–31 | 616,120 | 619,040 | 892,790 | 2,127,980 |

It should be noted that increased use would have to be made of storage in Hungry Horse to maintain the combined systems' prime power during the 3 low-water years examined. Other low-water years would probably be equally demanding on Hungry Horse storage and secondary energy, but in many years transfer or exchange of energy would be much less.

By assuming all the gain available to the Central Valley project, an easy comparison can be made with the expected arrangements in California under a contract expiring in 1971 between the Bureau of Reclamation and the Pacific Gas & Electric Co.

The two Federal systems under coordinated operation could develop an average critical period capability which is 652,000 kilowatts in excess of the critical period capability of the U.S. Columbia River power system alone. The average project use over the critical period of September 16 through April 15 is about 82,000 kilowatts. This project use includes estimates for the authorized and proposed features of the Central Valley project for 1970 including the project's share of pumping for the San Luis unit which would be jointly operated by the State of California and the Bureau of Reclamation. The transmission loss sustained on the remaining 570,000 kilowatts is about 8 percent, and the critical period load factor for preference customers of the project is expected to be about 57 percent in 1968–69. As a result of the 652,000 kilowatts, therefore, the Central Valley project could carry a firm commercial load of 920,000 kilowatts. At all other times the increase in capability, as a result of coordinated operation of the two systems, is greater than 652,000 kilowatts. Consequently, the 652,000 kilowatts provides the basis for increased firm power capability even though a greater average amount must be deducted for project use at other times.

The 920,000 kilowatts of firm commercial power is 183,000 kilowatts larger than the estimated 737,000 kilowatts of firm capacity available for sale to preference customers under the Pacific Gas & Electric Co. contract.

Rather than marketing the incremental capability from coordination in the Central Valley it could, of course, be marketed in the Pacific Northwest. Critical period energy required to support the

737,000 kilowatts of firm commercial power is 457,000 average kilowatts at 57-percent load factor and 8-percent transmission loss. The 652,000 kilowatts exceeds this amount and the project pumping of 82,000 kilowatts by 113,000 kilowatts. The Pacific Northwest could therefore be allocated 113,000 kilowatts of critical period energy under coordination with the Central Valley project without reducing the firm commercial load which the project could serve with support by Pacific Gas & Electric Co.

### CONCLUSIONS

Based on the analyses presented in this study of coordination between the U.S. Columbia River power system and the Central Valley project, the following conclusions are reached:

1. No gain in Central Valley project dependable capacity can be realized from exchanging Central Valley project and U.S. Columbia River power system surplus energy after serving all other secondary energy requirements including interruptible industrial loads and steam displacement in each area.

2. Based on operating the Central Valley project system and the U.S. Columbia River system as a single unit for the purpose of increasing the combined Federal system critical year energy and allocating all of the increased critical year energy to the Central Valley project, an increase in firm capacity for preference customers of 183,000 kilowatts can be realized in excess of the integration contract between the Bureau of Reclamation and the Pacific Gas & Electric Co. This would encroach on some high availability interruptible power and provisional power supplied industries in the Pacific Northwest and some high availability secondary energy supplied the utilities for steam displacement. If the allocation of coordination benefits were made so that the Central Valley project secured the same firm commercial capacity as it does under its contract with the Pacific Gas & Electric Co., then about 113,000 average kilowatts of critical year energy could be allocated to the Pacific Northwest. Although this extension of firm will, in many of the years, encroach on the availability of secondary energy in the Pacific Northwest, it does so only through the conversion of secondary energy to a firm resource.

3. In the future, with increasing installations on the U.S. Columbia River system, when diversities between the two systems would vanish, the benefits of coordination will not be as great as shown for 1968–69.

## III. NATIONAL DEFENSE ASPECTS OF A PACIFIC NORTHWEST-CALIFORNIA INTERTIE

Northern California and the Pacific Northwest produce large amounts of commodities important for national defense, such as foodstuffs, lumber, plywood, pulp, paper, plutonium, aluminum, ferroalloys, petroleum products, chemicals, aircraft, lead, zinc, copper and other minerals, and machinery and equipment. Production of some of these commodities such as aluminum, aircraft, pulp, paper, ferroalloys, and plutonium require large amounts of electric energy. Tieing together the Pacific Northwest's 11 million kilowatts of installed power capacity with northern California's 5 million kilowatts of in-

stalled power capacity would enable each area to offer some assistance to the other if the delivery of power were restricted as a result of system disturbances or emergencies. The extent to which assistance could be offered would, of course, depend upon the size of the interconnection. Also, surplus secondary energy from the Pacific Northwest could be used to conserve fuel in California, and off-peak fuel generation in California could be used to firm up some interruptible loads in the Pacific Northwest during a national emergency.

Diversities in loads and in streamflows between the Pacific Northwest and northern California indicate that one area normally could assist the other. In northern California, energy requirements reach a maximum during the summer due to irrigation, while energy requirements in the Pacific Northwest reach a maximum during the winter as a result of heating and lighting loads. Streamflows reach a maximum in northern California in the winter and spring, while runoff of the Columbia River system is at a peak during the late spring and early summer. Fuel conservation could accrue from such an intertie in that northern California relies on fuel plants for about 50 percent of its electric energy generation, while over 95 percent of the energy generated in the Pacific Northwest is from hydroelectric plants.

In the Pacific Northwest, industrial capacity requiring about 45,000 kilowatts depends upon interruptible power supplies from the U.S. Columbia River power system. Most of this capacity is in aluminum reduction plants, but other capacity important to national defense, such as ferroalloys and chemicals, is also served on an interruptible basis. About one-third of the region's aluminum capacity is served on an interruptible basis and this results in about 9 percent of the national aluminum reduction capacity dependent on interruptible power supplies in the Pacific Northwest.

In case of critical water conditions in the Pacific Northwest, a Pacific Northwest-California transmission intertie could aid in the power service to defense industries such as aluminum reduction served on an interruptible basis. However, in an adverse water year in California surplus energy may not be available to the Pacific Northwest. Electric energy generated at fuel plants in the San Francisco Bay area could serve part of the load of such plants depending upon the size of the interconnection. Cost of such energy would be relatively high compared with hydroelectric costs in the Pacific Northwest, but in a national emergency it may still be desirable to import the higher cost power to secure needed production of strategic materials. Also, it probably would be more economical to import this surplus thermal-generated energy for existing furnaces in the Pacific Northwest than to build new industrial capacity elsewhere or to build thermal-generating plants in the Pacific Northwest to firm up these interruptible industrial loads.

Service to interruptible loads by import of surplus energy from northern California would not require additional steam-electric capacity in California. In other than adverse water years in California, off-peak energy delivered to interruptible loads would result in water being stored in reservoirs in the Pacific Northwest. Such water could be released to generate electric energy during peak hours. This would result in a higher load factor operation of steamplants in northern California than otherwise would be the case and therefore would utilize less fuel than starting up fuel generating plants in the Pacific Northwest.

Flexibility of the Columbia River power system would also enable aid to be provided northern California in case of an emergency. Even with critical hydroelectric conditions, water could be released so as to transmit energy south. As long as energy could be returned later during the storage drawdown period, which now extends from September 15 to April 15 of the critical year, no loads would have to be curtailed in the Pacific Northwest to meet such an emergency.

The existing interconnection between northern and southern California would, to a very limited extent, enable the Columbia River power system and southern California to provide each other with some mutual assistance through the power facilities in northern California.

## IV. TRANSMISSION PLANS, COSTS, AND ECONOMIC FEASIBILITY

Directive No. 4 of the Senate committee resolution asks for a determination of the maximum voltage economically feasible for a Pacific Northwest-California transmission interconnection, both initially and ultimately. Initial feasibility was considered as applying to the next 10-year period and the longer range feasibility to a 25-year period. The economic feasibility shows the overall benefits and therefore is based on the incremental investment required to tie together the Pacific Northwest and California systems regardless of ownership. Problems relating to ownership are discussed in chapter VIII, which deals with financial feasibility. Annual charges are based on Federal costs, the components of which are discussed in chapter VII.

### *Existing facilities*

The San Francisco Bay area is served by seven 230-kilovolt circuits from the Pit River-Shasta area. Four are owned by the Pacific Gas & Electric Co. and three by the Bureau of Reclamation. There are also a 115- and a 60-kilovolt connection between the COPCO system in Oregon and the P.G. & E. system at Cottonwood in California. Capacity of these interconnections is limited to approximately 60,000 kilowatts.

The Bonneville Power Administration has a 230-kilovolt circuit extending from Big Eddy near The Dalles to Yamsay, Oreg., where it interconnects with COPCO's 230-kilovolt line which in turn extends to Klamath Falls, Oreg. (Maps showing the two areas and interconnections studied face p. 36.)

### *Plans of interconnection*

Various plans of interconnection were examined to determine the maximum amount of power, in addition to the power that could be transmitted over the present interconnections, that would be economically feasible to transmit for use in California. These plans, outlined in appendix table 31, include 230,000 and 345,000 voltage lines and capacities ranging from 160,000 to 510,000 kilowatts.

Joint a-c network analyzer and digital computer studies were made by the Bonneville Power Administration, the Bureau of Reclamation, and the Pacific Gas & Electric Co. for each of the plans of interconnection listed in appendix table 31. From these studies, it was possible to determine the capacity for each plan with a reasonable margin of safety below the steady state stability limit so that the two systems would remain stable under most fault conditions. In addition, these studies were used to determine the specific transmission

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facilities required for satisfactory operation of the various plans and also to determine the transmission losses.

*Transmission requirements*

Transmission requirements for the various plans were studied for the initial period of 1961. This analysis started with the simplest, least costly plan and progressed in transmission capability to the plans that were determined not be be economically feasible. The third map facing page 36 shows that the shortest tie between the two areas is a 230-kilovolt circuit from Klamath Falls to Pit No. 3, a distance of approximately 95 miles. With a tie at Pit No. 3, the generating plant there could be sectionalized such that the output of two units of the Pit No. 3 plant would be connected to the other Pit River plants and transmitted to Cottonwood over two circuits. The third circuit would be available to carry the energy imported from the Pacific Northwest and the output of one unit at Pit No. 3. This first tie does not require any other facilities in either Oregon or California to transmit as much as 160,000 kilowatts to the load centers in the bay area. This explains the relatively low investment required. Incremental investment required for each plan is shown in appendix tables 32 and 33.

From the analyzer studies, we have concluded that this 230-kilovolt circuit could probably safely carry 200,000 kilowatts. The increased loadings on the intertie line would require additional capacitors compared with the 160,000-kilowatt loading. Because of the alternative use planned for the transmission capacity from Cottonwood to the bay area, a proportion of the cost of such facilities was charged in case of the 200,000-kilowatt loading.

We also examined a second 230-kilovolt circuit from Redmond terminating at P.G. and E.'s Butt Valley powerplant on the Feather River. Termination of the line at Keswick and Cottonwood were also examined but proved to be more costly than terminating at Butt Valley, since additional transmission facilities will be necessary at some future date. If the line were terminated at Butt Valley, there would be adequate transmission capacity to the bay area because of reregulation of the Feather River plants. The proposed Round Butte Dam near Redmond, Oreg., was assumed in the resources so no additional circuits were required in Oregon. Without this Round Butte project, an additional 230-kilovolt circuit would be required from Big Eddy to Redmond. The second 230-kilovolt circuit was loaded to 160,000 kilowatts.

The next plan considered was a 345-kilovolt circuit from Redmond to either Keswick or Cottonwood. Another plan analyzed was this 345-kilovolt circuit, together with one 230-kilovolt circuit to Cottonwood or Keswick. This plan required reinforcement in the Bonneville system of a second 230-kilovolt circuit from Big Eddy to Redmond and reinforcement in California of either a 230-kilovolt or 345-kilovolt circuit from Cottonwood or Keswick to the bay area. The 345-kilovolt line carried 350,000 kilowatts, which is well below the steady state stability limit for the intertie. None of the plans involving 345-kilovolt transmission were economically feasible. The lowest cost 345-kilovolt circuit would be from Redmond to Cottonwood.

Direct current transmission for voltages of 400 and 600 kilovolts was investigated. Comparisons were made between the direct current

transmission and 345 and 460 kilovolt alternating current transmission. In the case of direct current, feasibility depends upon the cost of terminal equipment. No terminal equipment of the type required by these circuits is manufactured in the United States today. Consequently, only meager information on the technical problems and the costs involved are available. With this information, we could not arrive at any conclusions. However, if sufficient power (600,000 kilowatts or more) were to be transmitted a distance similar to those proposed in this interconnection, further investigation of direct current transmission would be warranted.

*Economic feasibility*

Economic feasibility of each plan of interconnection was determined by comparing the cost of incremental transmission facilities necessary to transmit the surplus energy from the Pacific Northwest to California with the value of the energy that otherwise would have to be generated in California. Incremental transmission cost per kilowatt-hour was calculated by dividing annual charges by the energy transmitted over the line.

Additional investment required disregarding ownership was determined and annual charges calculated assuming Federal cost ratios based primarily on the experience of the Bonneville Power Administration. The annual charges for each plan include operations and maintenance, administration and general expense, interest and amortization based on a 10-year and a 25-year period. These charges are discussed in chapter VII.

Utilization of the energy was determined from availability of surplus energy in the Pacific Northwest, acceptability of this energy at the load centers in the bay area, and losses in delivering this energy. Appendix table 34 shows the capacity factor or the proportion of the time that various amounts of surplus power are available and usable in the San Francisco Bay area. Since the acceptability bears a random relationship to the availability, multiplication of the two factors gives a composite which, when multiplied by the assigned capacity of the tie lines, provides the annual kilowatt-hours of energy that could be transferred to the bay area. The validity of capacity factors obtained by multiplying the acceptability factor by the availability factor were confirmed by a special analysis.

Value of the energy in California is assumed to be the savings from backing-off of thermal-electric units in the San Francisco Bay area. Units operated in connection with refineries or for other reasons which could not economically be shut down were not included in the analysis. These savings are shown in appendix table 35 and assume oil or gas equivalent at $1.85 per barrel. It is also assumed that the units will be maintained on a spinning reserve basis to pick up the load in case of an outage on the intertie line. If the steam spinning reserve could be avoided part of the time, the value of energy would be somewhat larger. In case such additional spinning reserve could be completely eliminated, then the value of energy in the bay area might be as much as one-half mill per kilowatt-hour larger.

*Flows north*

In the analysis of economic feasibility, no value has been placed on the use of the intertie for potential flows of surplus energy from California to the Pacific Northwest, although possibilities of such flows

are discussed in chapter III. Because of the relatively high cost of incremental steam generation in California compared with the low cost of hydroelectric energy in the Pacific Northwest, such energy would flow from California to the Pacific Northwest only in case of emergency or in case aluminum producers in the Pacific Northwest found it feasible to purchase such high cost energy at times when interruptible power was not available. As previously mentioned in chapter III, surplus thermal-generated energy may not be available from California in case of adverse water conditions there. In any event, it would not be feasible for the Bonneville Power Administration to firm up its high-availability secondary with such thermal-generated energy as long as Bonneville has a market for such secondary energy at rates comparable to its firm power rates.

*Conclusions*

Appendix tables 32 and 33 summarize the transmission cost data for each of the interconnections studied. The cost data include investment, annual costs, and costs per kilowatt-hour for each case. The results of the feasibility study are also shown in charts I and II. These charts indicate that two 230 kilovolt circuits are economically feasible for the assumption of the report. The second 230 kilovolt circuit would not be feasible unless Round Butte or some other generating project were constructed in central Oregon.

The benefit-cost ratio based on a 10-year amortization period for a 230-kilovolt interconnection with a capacity of 160,000 kilowatts is 4.13 to 1. This interconnection requires the lowest additional investment, $4,191,800. Adding 40,000 kilowatts of capacity by increasing the capability of the 230-kilovolt connection to 200,000 kilowatts has a benefit-cost ratio of 2.79 to 1. Under this plan, a share of the additional facilities that will be required with the Pit-McCloud and Trinity generating plants are allocated to the intertie since the transmission of secondary energy from the Pacific Northwest to California should be considered as incremental to the transmission of other energy sources developed in California.

A second 230-kilovolt circuit from Redmond to Butt Valley has a benefit-cost ratio incremental to the 200,000-kilowatt capacity, 230-kilovolt circuit of 1.07 to 1. A 345-kilovolt circuit is not feasible having a benefit-cost ratio incremental to the 230-kilovolt circuit of only 0.48 to 1.

Analysis was made on the basis of Federal financing. Examination was also made on the basis of private financing, and again two 230-kilovolt circuits should be considered as economically feasible, the second one being a borderline case. Since this report conservatively values energy in California and does not evaluate benefits for emergencies or energy that might flow north, borderline cases should be considered feasible.

A direct interconnection between the Bonneville system in Oregon and the Central Valley system in California was also examined but was not included among the plans since it is more costly than plan II. A 230-kilovolt circuit from Yamsay to Keswick, with a capacity of 200,000 kilowatts, would cost $10,805,200. Benefit-cost ratio would be 2 to 1. A second 230-kilovolt circuit from Redmond to Keswick which would cost an additional $24,073,800 would not be economically feasible as its benefit-cost ratio would be 0.55 to 1.

The 25-year amortization studies yield approximately the same benefit-cost ratios as the 10-year amortization studies. The reduced availability and use of the secondary energy compensates for the much lower amortization charge on the investment.

Detailed feasibility analysis was not included for the interconnection plans having a greater cost and capacity than those shown because the preliminary investigations of these plans indicated that they would not be feasible. These plans included two 345-kilovolt ties and a 460-kilovolt tie. Preliminary investigations also were made by Bonneville Power Administration staff of a direct current tie. This tie also was not feasible under the assumptions of the study.

Economic feasibility was also examined utilizing the low instead of the high estimate of loads for the Pacific Northwest. This analysis also indicates that transmission lines with voltages in excess of 230,000 are not economically feasible.

## V. CONSERVATION AND MAXIMUM UTILIZATION OF FOSSIL FUELS AND HYDROELECTRIC RESOURCES IN THE TWO REGIONS

A portion of the hydroelectric energy which is surplus to present needs of the Pacific Northwest could be exported on a when-available basis for use in California to displace electric energy now generated in steam-electric plants using oil or gas.

To the extent that this type of power is usable in California, a Pacific Northwest-California intertie sufficient to transmit it would encourage conservation of fossil fuels in California and enable greater utilization of hydroelectric resources in the Pacific Northwest. Falling water, which is a basic renewable resource, is not being used to the fullest extent in the Pacific Northwest, while it could be utilized to a greater extent by exportation of electric energy surplus to the needs of the Pacific Northwest to California to replace steam-generated electric energy and thereby conserve oil and gas which are exhaustible resources.

At the present time, a considerable amount of potential hydroelectric energy from the Federal Columbia River power system is not being utilized in the summer months of each year and many winter months in wet years. As the Pacific Northwest load grows, this surplus hydroelectric energy will become usable by construction of additional storage reservoirs and integration with steam-electric plants which inevitable will be required to meet the load growth in the area. The Pacific Northwest gradually will require more and more of its available hydroelectric energy and, as indicated in chapter I, will require all of it prior to 1985.

Such a temporary export of surplus Pacific Northwest hydroelectric energy would conserve oil and gas in California. For example, during the decade 1961–70, each 650 kilowatt-hours of surplus hydroelectric energy delivered to the San Francisco Bay area would displace approximately 1 barrel of fuel oil or its equivalent in gas. With the construction of a 230 kilovolt interconnection in addition to the 115 kilovolt and 60 kilovolt interconnections, an average annual use of approximately 1.3 million barrels of fuel oil, or equivalent gas, would be displaced.

Availability of surplus Pacific Northwest hydroelectric energy fluctuates widely as shown in appendix tables 4 through 9. In a few

wet years, it would be available initially throughout the year; in dry years it would be available in only about 4 months of the year. As a result of such wide fluctuations, it would be impracticable to use all the available surplus hydroelectric energy to displace fuel. Two factors place a limitation on the extent of fossil fuel cutback: (1) Substantial minimum fuel oil purchase commitments must be made in all years; otherwise, suppliers would find it necessary to change their production and refining methods, and the firm supply of oil required to meet loads in a dry year would not be available; and (2) the use of natural gas in steam-electric plants on an interruptible basis is of the utmost importance in contributing to an economic natural gas supply for California by making it possible to use the costly pipeline at high capacity factors and to enter into favorable contracts with producers. Cutback below firm obligations cannot be made without seriously impairing the economy of the entire gas supply.

Costs of transmission to move large blocks of energy from the Pacific Northwest to California also limit the extent to which hydroelectric energy surplus to the needs of the Pacific Northwest can be utilized to conserve fossil fuels in California.

## VI. RIGHTS OF PREFERENCE CUSTOMERS

Directive No. 6 of the Senate resolution requests an examination of the effect, if any, of the proposed interconnection on the geographical extent of the Bonneville Power Administration service area and on the rights of preference and other customers within the service area to require power from the Bonneville system. To answer this question, an opinion was requested from the Portland regional solicitor of the Department of the Interior. His opinion, which follows, indicates that preference customers in California would have priority in the purchase of both firm and secondary energy over nonpreference customers in the Pacific Northwest.

U.S. DEPARTMENT OF THE INTERIOR,
OFFICE OF THE SOLICITOR,
PORTLAND REGION,
*Portland, Oreg., November 4, 1959.*

Memorandum.
To: Bonneville Power Administrator.
From: Portland regional solicitor.
Subject: California interconnection.

On May 19, 1959, the Senate Committee on Interior and Insular Affairs adopted a resolution requesting the Secretary of the Interior to conduct, through the Bonneville Power Administration in cooperation with the Bureau of Reclamation, a study and analysis of the feasibility and desirability of a high voltage interconnection for disposal of surplus secondary energy between the Federal power systems in the Pacific Northwest and California. The resolution directed that the study and analysis should include, inter alia, "the effect, if any, that the proposed interconnection would have on the geographical extent of the Bonneville Power Administration service area and the effect, if any, on the rights of preference customers in the service area to require power from the Bonneville system."

The Bonneville Project Act does not provide any statutory geographical limits on the area in which power is to be marketed. On the contrary, the Administrator is directed to construct and operate such transmission lines as he finds appropriate for the purpose of transmitting energy, available for sale, to existing and potential markets. This authorization and directive are "in order to encourage the widest possible uses of all electric energy that can be generated and marketed and to provide reasonable outlets therefor." [1] It follows that the outer limit within

[1] Bonneville Project Act, sec. 2(b), 50 Stat. 732.

which there is authority to market power is the practical one of economic transmission distance. That outer boundary is established initially by physical restrictions on the ability to deliver energy, but more stringently by the necessity for the recovery of the costs of the project.[2] This same concept is reflected in the grant of reasonable opportunity and time to "people of the States within economic transmission distance of the Bonneville project" to organize public bodies and cooperatives and become qualified purchasers and distributors of energy.[3]

Similarly, there are no statutory geographical limits on the area in which power marketed by the Secretary of the Interior, pursuant to section 5 of the Flood Control Act of 1944,[4] may be sold. Here, too, the Secretary is directed to "dispose of such power and energy in such manner as to encourage the most widespread use thereof at the lowest possible rates to consumers consistent with sound business principles." Nor are there any statutory geographical limits on the area in which power from reclamation projects is to be marketed.[5]

It may be noted in passing that while the Secretary, as an administrative matter, has established no formal marketing area for the Columbia River power system, he has indicated a division of marketing responsibility between the Bonneville Power Administration and the Bureau of Reclamation at certain points. The Continental Divide is the division point between the two agencies in Montana.[6] The California-Oregon border is a similar division point between the Columbia River system and the Central Valley project.[7] The southern Idaho area presents still another division of responsibility. The Federal power supply in this area is solely from reclamation projects, and that power has been marketed by the Bureau of Reclamation. This practice is based upon operations in that manner for many years.

It is both unnecessary and beyond the scope of this memorandum to explore the outer limits of the extent of the Secretary's authority to prescribe definitive areas within which power shall be marketed. The location of such limits will vary, depending on the facts and the circumstances involved. For example, the initial lack of a power supply sufficient to meet the needs of all preference applicants within economic transmission distance justified the imposition of a smaller geographical marketing area in the Missouri River Basin. Similarly, the necessity for protecting the financial integrity of projects in different geographical areas may require balancing, by means of prescribed marketing areas, even conflicting statutory provisions with respect to such projects. For these reasons, it is impossible to generalize on the periphery of the Secretary's authority to confine or withdraw the marketing of power to specific areas. Each case must be decided on the basis of its own factual situation. It is sufficient for the purposes of this memorandum to indicate that in the absence both of any statutory limitations and of some such special circumstances as would authorize the establishment of a prescribed marketing area where none is expressly imposed by statute, the marketing area of the Columbia River system, once it is extended to California, could not be withdrawn to north of the California-Oregon border solely because all the power from the Columbia River plants would be needed in the Pacific Northwest.

To the extent that, and during any period in which, power from the Columbia River system may be marketed in any given area, the policies with respect to the disposition of power prescribed in the Bonneville Project Act and other marketing acts are applicable to all dispositions. The preference provisions comprise only one of these policies. There is no basis for any claim, for example, that power from the Bonneville project could be sold in California at rates established by the

[2] That obligation is implicit in the directive that "rate schedules shall be drawn having regard to the recovery * * * of the cost of producing and transmitting such electric energy, including the amortization of the capital investment over a reasonable period of years." Sec. 7, 50 Stat. 735.

[3] Sec. 4(d), 50 Stat. 734.

[4] 58 Stat. 890.

[5] Reclamation Project Act of 1939, sec. 9(c), 53 Stat. 1194.

[6] "By definition, the Continental Divide is the division between the Columbia and Missouri River Basins. The Bonneville Power Administration and the Bureau of Reclamation, respectively, have responsibilities for power marketing in these two basins. The Continental Divide, therefore, will be the division between the areas of your respective power marketing responsibilities in Montana." Memorandum of Aug. 8, 1950, to Commissioner of Reclamation and the Administrator, Bonneville Power Administration.

[7] "The Bonneville Power Administration has responsibility for power marketing in the Pacific Northwest region and the Bureau of Reclamation has power marketing responsibility for the Central Valley project in California. The California-Oregon State line will therefore be the division point between the areas of your respective power marketing responsibilities.

"Neither agency will market power to a third party for use in the power marketing area of the other agency except by mutual consent.

"The marketing of power to be produced at future projects on the Klamath River will be the responsibility of the Bureau of Reclamation." Memorandum of Aug. 15, 1950, to Commissioner of Reclamation and the Administrator, Bonneville Power Administration.

Administrator or the Secretary without the approval of the Federal Power Commission. Nor is there any basis for a contention that any other statutory policy, including preference and priority to public bodies and cooperatives, can be ignored purely on geographical grounds. All policies, where applicable, must be followed regardless of the area in which the power may be sold or used.

The question has been asked whether the principles set forth above would be modified by including in all contracts for the sale of Columbia River power in California by the Bonneville Power Administration a clause permitting the Administrator to withdraw any of the power covered by these contracts if that power were needed in the Pacific Northwest. Such a contract provision would not modify either the terms of the preference clause or the effect of the application of that clause upon the disposition of Pacific Northwest power. Further, the exercise of the right created by such a clause would not solve the resulting problem of the disposition of the withdrawn power subsequent to its withdrawal.

If the power were withdrawn from a nonpreference customer in either the Pacific Northwest or in California, the Administrator could resell it to a preference applicant in either area. In the absence of a preference applicant in either area, he could also resell it to a nonpreference customer in either the Pacific Northwest or in California, because the marketing acts establish no priority in favor of one nonpreference applicant as against another. The preference provisions of the marketing acts would preclude the sale of the withdrawn power to a nonpreference applicant in either area if a preference applicant in either the Pacific Northwest or California applied for it.

These principles also provide the key to what would happen if the power were withdrawn from a preference customer. If it were a California customer, the Administrator could resell the power to a preference applicant in the Pacific Northwest. On the other hand, the statutes would not prohibit the withdrawal of power from a Pacific Northwest preference customer under a contract provision so permitting, and reselling it to a California preference applicant. There is no priority in favor of one preference applicant as against another of the same class, regardless of geographical situation. We repeat, however, that the withdrawn power could not be resold by the Administrator to a nonpreference applicant in either area in the face of an application for that power by a public body or a cooperative in either the Pacific Northwest or California. A California public body or cooperative in such a situation would still prevail over a nonpreference applicant in the Pacific Northwest.

The general principle that the preference provisions of the Bonneville Project Act must be followed regardless of the area in which the power may be sold or used is the key to the study requested by the Senate Committee on Interior and Insular Affairs. In applying that principle, it is obvious that legislation would be required to modify the preference provision in order to assure that power sold to California applicants, both preference and nonpreference, could subsequently be withdrawn and disposed of in the Pacific Northwest if that power were required in that area.

RAYMOND C. COULTER,
*Regional Solicitor.*

## VII. ESTIMATED CONSTRUCTION, OPERATION, AND MAINTENANCE COSTS

### *Annual charges*

Incremental investment required for various interconnection plans were discussed in chapter IV and presented in appendix tables 31, 32, and 33. Annual charges presented in these tables were based on the experiences of the Bonneville Power Administration. Annual costs based on Federal financing as a percent of investment are as follows:

[Percent of investment]

| | 230 kilovolts | | 345 kilovolts | |
|---|---|---|---|---|
| | 10-year basis | 25-year basis | 10-year basis | 25-year basis |
| Transmission circuits: [1] | | | | |
| Interest and amortization, reflecting salvage credit | 11.0 | 5.3 | 10.1 | 5.0 |
| Operation and maintenance | 1.0 | 1.0 | .4 | .4 |
| General expense | 1.1 | 1.1 | .8 | .8 |
| Total | 13.1 | 7.4 | 11.3 | 6.2 |
| Substations: | | | | |
| Interest and amortization, reflecting salvage credit | 7.0 | 4.0 | 7.0 | 4.0 |
| Operation and maintenance | 2.7 | 2.7 | 1.2 | 1.2 |
| General expense | 1.6 | 1.6 | 1.1 | 1.1 |
| Total | 11.3 | 8.3 | 9.3 | 6.3 |

[1] Wood pole for 230-kilovolt and steel for 345-kilovolt circuits.

*Interest rates*

Interest and amortization are based on the stated period giving credit to salvage value and assuming interest at 2½ percent per annum. If interest were assumed at 5 percent, total costs on a 10-year amortization basis for the 230-kilovolt facilities would be about 11 percent larger, but on a 25-year amortization basis, it would be about 24 percent larger.

*Private financing*

Annual costs with private financing on the assumption of a 6-percent return, property tax rate of 2 percent of investment, 52-percent Federal income tax rate, and 5½ percent State income tax rate would be only moderately larger than annual costs under Federal financing for a 10-year amortization period but considerably larger for a 25-year period. Annual charges (fixed costs, operation and maintenance, and overhead) under private financing for 10-year amortization for 230-kilovolt facilities would be about 15 percent of investment for transmission circuits and about 16 percent for substations. For 25-year amortization, annual charges would be about 13 percent of investment for transmission citcuits and for substations.

*Investment and operating costs*

As shown in appendix table 32, based on a 10-year amortization, a 230-kilovolt circuit from Klamath Falls to pit No. 3 with a 200,000-kilowatt capacity would require an additional investment of approximately $5,800,000, of which about $4,700,000 would be for the transmission circuit and about $1,100,000 for substations. Annual charges would be about $704,000, of which $580,000 would be interest and amortization, $62,000 direct operations and maintenance, and an additional $62,000 for administrative and general expense.

A second 230-kilovolt circuit would require an additional investment of about $11,800,000 with an annual cost on a 10-year amortization basis of $1,545,000, of which $1,279,000 would be for interest and amortization, $137,000 for direct operations and maintenance, and $129,000 for administrative and general expense.

The 230-kilovolt circuit from Yamsay, Oreg., to Keswick, Calif., to interconnect the two Federal systems directly with a capacity of 200,000 kilowatts would require an investment of about $10,800,000 and annual charges based on 10-year amortization of nearly $1,300,000. On a 25-year amortization basis, the annual charges would be nearly $800,000.

## VIII. FINANCIAL FEASIBILITY

Directive No. 8 of the Senate committee resolution inquires as to other financial aspects. In chapter IV, economic feasibility was presented without regard to ownership and was based on the incremental transmission costs involved. In that analysis no value was assigned to the costs of generating the secondary energy obtained from the U.S. Columbia River power system, since the purpose of the economic analysis was to determine overall incremental benefits regardless of ownership. Financial feasibility must take into account other factors involved, such as the terms and conditions, including rates, upon which the Bonneville Power Administration might sell this surplus secondary energy, ownership and use of new and existing facilities involved either directly or indirectly in the transmission of the energy, and reregulation of existing generating plants. The analysis is based on sale of the surplus secondary energy by the Bonneville Power Administration at its regular rates within its existing service area.

*BPA rates*

Rate schedules of the Bonneville Power Administration provide for a special application of the firm power schedules in case of interruptible power (sec. 15.1 of the General Rate Schedule Provisions). This special application provides for sale on a monthly basis without any ratchet so that the amount of energy purchased can vary from month to month. In addition, Bonneville has a dump rate, available primarily for steam displacement, for which the charge is 2½ mills per kilowatt-hour. The charge under the C rate on an interruptible basis is $1.46 per kilowatt of maximum demand for the month. At a monthly load factor of 95 percent, the cost would be 2.1 mills per kilowatt-hour. For sales in California, the assumption of a 95 percent monthly load factor appears reasonable.

*Conclusions*

Financial feasibility yields different results than economic feasibility in that both the cost of the energy itself to the purchaser and ownership of facilities must be taken into account in the financial analysis. Assuming that the Bonneville Power Administration sells its secondary energy within its service area and the purchaser is able to use it at a 95 percent load factor, the cost would be 2.1 mills per kilowatt-hour at the point of delivery. With the assumption that the market value would be represented by the savings in back off of steam-electric units in the San Francisco Bay area, and that existing transmission capacity

in California would be available by reregulating hydroelectric plants, it appears that only one 230-kilovolt circuit would be financially feasible. Such a circuit with a 200,000-kilowatt capacity would enable the Bonneville Power Administration to sell for delivery in California an annual average of 860 million kilowatt-hours of surplus energy over the next 10 years. At a price of 2.1 mills per kilowatt-hour, gross revenues would average $1,800,000 a year.

Interconnecting the COPCO and Pacific Gas & Electric systems, a distance of 95 miles from Klamath Falls to Pit No. 3, is less costly, both in terms of investment required and annual charges with private financing, than interconnecting the two Federal systems, a distance of 188 miles from Yamasay to Kaswick, with Federal financing. In addition to the shorter distance to the Pacific Gas & Electric system, this company can reregulate its Pit River generating plants so that no additional capacity would be needed between the Pit plants and the bay area for an interconnection with a capacity of 160,000 kilowatts. The Bureau of Reclamation would not be able to provide this capacity on its own system with the contractual arrangements presently in force with the Pacific Gas & Electric Co. which expires in 1971.

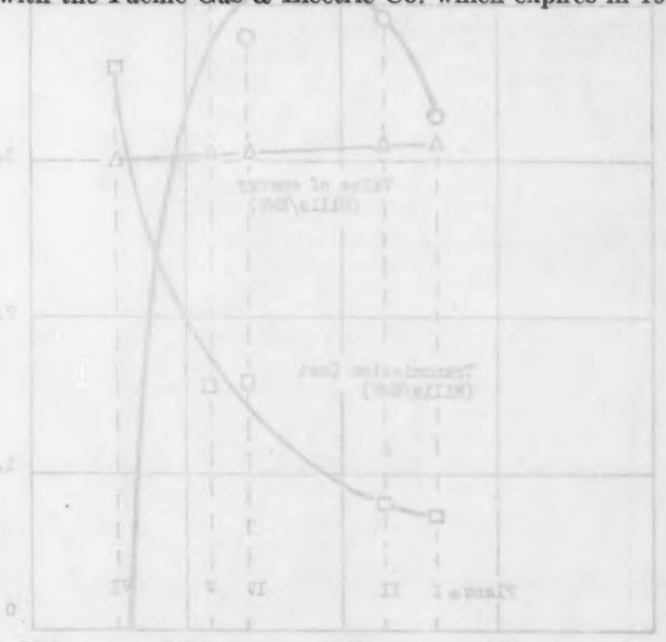
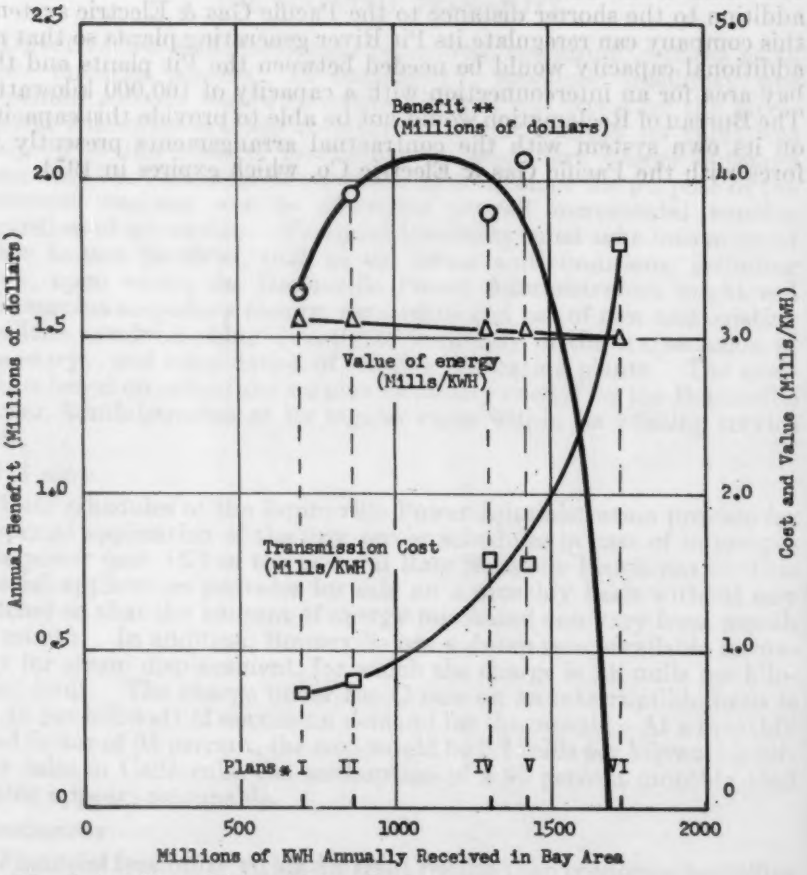


CHART I

ECONOMIC FEASIBILITY

BPA SURPLUS SECONDARY ENERGY TRANSMITTED
TO THE SAN FRANCISCO BAY AREA

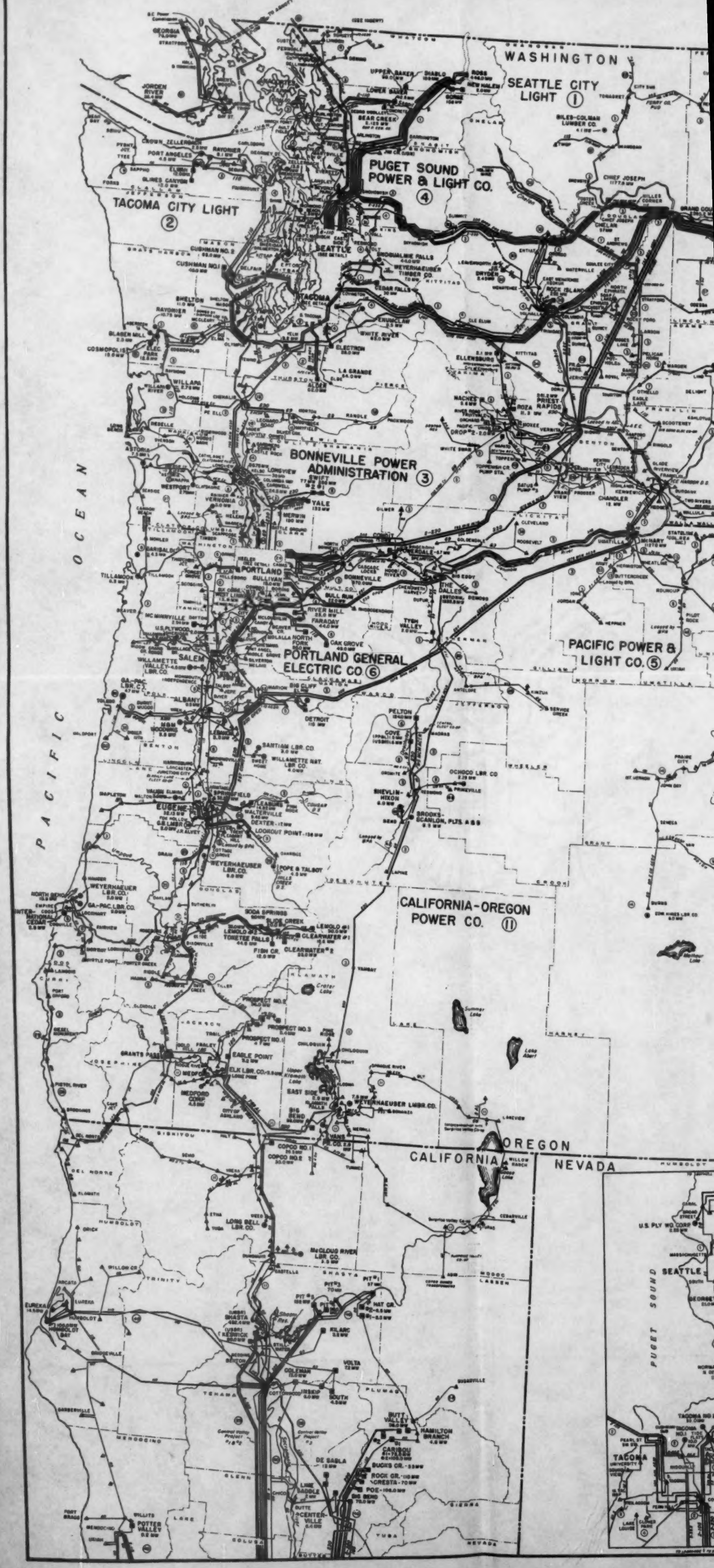
10-YEAR BASIS




*For description of transmission plans see appendix Table 31.

**Total annual value of energy minus total annual transmission cost.

Cost and Value (Mills/KWH)


WASHINGTON
SEATTLE CITY LIGHT (1)
PUGET SOUND POWER & LIGHT CO. (4)
TACOMA CITY LIGHT (2)
BONNEVILLE POWER ADMINISTRATION (3)
PORTLAND GENERAL ELECTRIC CO (6)
PACIFIC POWER & LIGHT CO. (5)
CALIFORNIA-OREGON POWER CO. (11)
OREGON
CALIFORNIA
NEVADA
PACIFIC OCEAN
PUGET SOUND
SEATTLE
TACOMA
PORTLAND
EUGENE
SALEM
ALBANY
ASTORIA
GRANTS PASS
MEDFORD
KLAMATH FALLS
EUREKA
YALE
MERWIN
SWIFT
BONNEVILLE
THE DALLES
ROZA
PRIEST RAPIDS
CHIEF JOSEPH
GRAND COULEE
ROCK ISLAND
WANAPUM
WELLS
CHANDLER
McNARY
ICE HARBOR
LOWER GRANITE
LITTLE GOOSE
LOWER MONUMENTAL
DWORSHAK
HELLS CANYON
BROWNLEE
OXBOW
BIG CLIFF
DETROIT
SANTIAM
FOSTER
GREEN PETER
LEABURG
WALTERVILLE
DEXTER
LOOKOUT POINT
COUGAR
TIMOTHY LAKE
SHEVLIN-HIXON
BROOKS-SCANLON, PLTS. A & B
OCHOCO LBR. CO
PRINEVILLE
ROUND BUTTE
PELTON
TYEE
ELDORADO
ROGUE RIVER
COPCO NO. 1
COPCO NO. 2
IRON GATE
KESWICK
SHASTA
McCLOUD RIVER LBR. CO.
LONG BELL LBR. CO.
ELK LBR. CO.
EAGLE POINT
EAST SIDE
BIG BEND
PIT NO. 1
PIT NO. 3
PIT NO. 5
HAT CR.
KILARC
COLEMAN
VOLTA
INSKIP
SOUTH
BUTT VALLEY
HAMILTON BRANCH
CARIBOU
BUCKS CR.
ROCK CR.
CRESTA
POE
DE SABLA
CENTERVILLE
POTTER VALLEY
LAKE SABRINA
HUNTINGTON
U.S. PLY WD. CORP.
TACOMA
SEATTLE

DOMINION OF CANADA

IDAHO

MONTANA

WASHINGTON (7) WATER POWER CO.

WASHINGTON

OREGON

IDAHO POWER CO. (9)

IDAHO

NEVADA

UTAH

UTAH POWER & LIGHT (10)

PORTLAND DETAIL

MINION OF CANADA
IDAHO
WASHINGTON (7) WATER POWER CO.
IDAHO POWER CO. (9)
MISSOULA
BOISE
NEVADA
UTAH
PORTLAND DETAIL

UNITED STATES DEPARTMENT OF THE INTERIOR
BONNEVILLE POWER ADMINISTRATION
HEADQUARTERS - PORTLAND, OREGON

# PACIFIC NORTHWEST TRANSMISSION SYSTEM

JANUARY 1, 1960

| REVISIONS | |
|---|---|
| DATE | REMARKS |
| 1/1/1960 | BPA |
| 1/1/1960 | OTHER UTILITIES |

Approved
Date 3-18-60 Chief Engineer

Designed by HGT Traced by FCA
Drawn by FCA Checked by RW Jr

38913-A

CALIFORNIA
OREGON
NEVADA
PACIFIC OCEAN
46
LEGEND
GENERATING STATIONS
200,000 KW AND MORE
25,000 TO 199,999 KW
24,999 KW AND LESS
Fuel
Hydro
( Numbers in symbols refer to Plant list )

NEVADA

IDAHO

# PLANT LIST

| Plant Number | Name of Plant | Mw Capacity and Type | Utility Abbreviations |
|---|---|---|---|
| | **CALIFORNIA** | | |
| 1 | Adams auxiliary | 2.5 Hy | LOAD |
| 2 | Adams Main | 5.0 Hy | LOAD |
| 3 | A. E. Wishon | 12.8 Hy | PAGE |
| 4 | Alamitos | 156.3 St* | SCE |
| 5 | Alta | 2.0 Hy | PAGE |
| 6 | Alturas | 3.5 St | MAPL |
| 7 | American River | 5.7 Hy | PAGE |
| 8 | Angels | 1.6 Hy | PAGE |
| 9 | Antioch | 10.1 St | PIPI |
| 10 | Arcata | 1.3 St | NCPC |
| 11 | Avalon | 2.1 IC | SCEI |
| 12 | Avon | 40.0 St | PAGE |
| 13 | Azusa | 8.0 Hy | PASA |
| 14 | Balch | 31.0 Hy | PAGE |
| | | 37.2 Hy* | PAGE |
| 15 | Beardsley | 10.0 Hy* | OAKJ |
| 16 | Belden | 117.0 Hy* | PAGE |
| 17 | Belridge | 3.2 IC | BEDC |
| 18 | Big Bend | 52.0 Hy | PAGE |
| 19 | Big Creek No. 1 | 81.0 Hy | SCEC |
| 20 | Big Creek No. 2 | 62.0 Hy | SCEC |
| 21 | Big Creek No. 2A | 66.0 Hy | SCEC |
| 22 | Big Creek No. 3 | 135.0 Hy | SCEC |
| 23 | Big Creek No. 4 | 99.0 Hy | SCEC |
| 24 | Big Creek No. 8 | 50.5 Hy | SCEC |
| 25 | Big Pine | 3.2 Hy | LOAD |
| 26 | Wishon Creek No. 2 | 6.3 Hy | CAEP |
| 27 | Wishon Creek No. 3 | 6.6 Hy | CAEP |
| 28 | Wishon Creek No. 4 | 6.3 Hy | CAEP |
| 29 | Wishon Creek No. 5 | 5.5 Hy | CAEP |
| 30 | Wishon Creek No. 6 | 1.8 Hy | CAEP |
| 31 | Brawley | 13.3 IC | IMID |
| 32 | Broadway | 80.0 St | PASA |
| 33 | Bucks Creek | 98.0 Hy | PAGE |
| 34 | Bullards Bar | 6.5 Hy | PAGE |
| 35 | Burbank | 76.0 St | BURB |
| 36 | Butt Valley | 36.0 Hy* | PAGE |
| 37 | Caribou | 75.0 Hy | PAGE |
| 38 | Caribou No. 2 | 109.8 Hy* | PAGE |
| 39 | Centerville | 6.4 Hy | PAGE |
| 40 | Central | 18.0 St | USN |
| 41 | Control | 4.5 St | LSPL |
| 42 | Coal Canyon | 0.8 Hy | PAGE |
| 43 | Coleman | 13.8 Hy | PAGE |
| 44 | Colgate | 24.0 Hy | PAGE |
| 45 | Contra Costa | 536.5 St | PAGE |
| 46 | Control Gorge | 37.5 Hy | LOAD |
| 47 | Copco One | 20.0 Hy | CAEP |
| 48 | Copco Two | 27.0 Hy | CAEP |
| 49 | Cottonwood | 1.5 Hy | LOAD |
| 50 | Cow Creek | 1.2 Hy | PAGE |
| 51 | Creeta | 97.5 Hy | PAGE |
| 52 | Deer Creek | 5.5 Hy | PAGE |
| 53 | DeSabla | 13.0 Hy | PAGE |
| 54 | Division Creek | 0.6 Hy | LOAD |
| 55 | Dunnella | 50.0 Hy* | OAKJ |
| 56 | Dan Pedro | 27.0 Hy | MOID |
| | | | TUID |
| 57 | Drop No. 2 | 10.0 Hy | IMID |
| 58 | Drum | 46.0 Hy | PAGE |
| 59 | Dutch Flat | 22.0 Hy | PAGE |
| 60 | Early Intake | 3.4 Hy | SAFR |
| 61 | El Centro | 50.0 St | IMID |
| | | 44.0 St* | IMID |
| 62 | Eldorado | 20.0 Hy | PAGE |
| 63 | Electra | 80.1 Hy | PAGE |
| 64 | El Segundo | 154.3 St | SCEC |
| | | 156.2 St* | SCEC |
| 65 | Encina | 105.0 St | SADG |
| | | 100.0 St* | SADG |
| 66 | Etiwanda | 265.0 St | SCEC |
| 67 | Eureka | 19.3 St | PAGE |
| 68 | Exchequer | 512.5 Hy | MERS |

| Plant Number | Name of Plant | Mw Capacity and Type | Utility Abbreviations |
|---|---|---|---|
| | **CALIFORNIA ( cont'd )** | | |
| 69 | Fall Creek | 2.3 Hy | CAEP |
| 70 | Forad | 2.8 Hy | SIPP |
| 71 | Feather Falls | 3.3 St | FEPP |
| 72 | Folsom | 162.0 Hy | USBR |
| 73 | Fortuna | 1.9 Hy | SCEC |
| 74 | Franklin Canyon | 2.0 Hy | LOAD |
| 75 | Glendale | 80.0 St | GLPS |
| 76 | Haas | 135.2 Hy* | PAGE |
| 77 | Haiwee | 6.6 Hy | LOAD |
| 78 | Halsey | 12.0 Hy | PAGE |
| 79 | Hamilton Branch | 5.2 Hy | PAGE |
| 80 | Harbor | 358.6 St | LOAD |
| 81 | Hat Creek No. 1 | 16.0 Hy | PAGE |
| 82 | Hat Creek No. 2 | 10.0 Hy | PAGE |
| 83 | Highgrove | 140.0 St | CAEP |
| 84 | Humboldt Bay | 58.2 St* | PAGE |
| 85 | Hunters Point | 235.1 St | PAGE |
| | | 156.2 St* | PAGE |
| 86 | Huntington Beach | 200.0 St* | SCEC |
| 87 | Inskip | 6.0 Hy | PAGE |
| 88 | Junction City | 2.7 Hy | PAGE |
| 89 | Kaweah No. 1 | 2.3 Hy | SCEC |
| 90 | Kaweah No. 2 | 3.1 Hy | SCEC |
| 91 | Kaweah No. 3 | 3.9 Hy | SCEC |
| 92 | Kerckhoff | 34.1 Hy | PAGE |
| 93 | Kern | 152.0 St | PAGE |
| 94 | Kern Canal | 10.4 Hy | SCEC |
| 95 | Kern Canyon | 6.5 Hy | PAGE |
| 96 | Kern River No. 1 | 24.8 Hy | SCEC |
| 97 | Kern River No. 3 | 36.0 Hy | SCEC |
| 98 | Kesefck | 75.0 Hy | USBR |
| 99 | Kilarc | 3.0 Hy | PAGE |
| 100 | Kings River | 94.1 Hy* | PAGE |
| 101 | La Grange | 3.9 Hy | TUID |
| 102 | Lassen | 2.5 St | PASA |
| 103 | Lime Saddle | 1.6 Hy | PAGE |
| 104 | Long Beach | 384.5 St | SCEC |
| 105 | Lower Tule | 2.0 Hy | SCEC |
| 106 | Loyalton | 2.3 St | CLYL |
| 107 | Lytle Creek | 0.6 Hy | SCEC |
| 108 | Mandalay | 436.0 St | SCEC |
| 109 | Martinez | 40.0 St | PAGE |
| 110 | McCloud | 3.5 St | MCCL |
| 111 | Melones | 24.3 Hy | PAGE |
| 112 | Merced Falls | 3.4 Hy | PAGE |
| 113 | Middle Gorge | 37.5 Hy | LOAD |
| 114 | Mill Creek | 2.4 Hy | CAEP |
| 115 | Mill Creek No. 1 | 6.8 Hy | SCEC |
| 116 | Mill Creek No. 2 & 3 | 3.0 Hy | SCEC |
| 117 | Moccasin | 75.0 Hy | SAFR |
| 118 | Morro Bay | 156.2 St | PAGE |
| | | 195.3 St* | PAGE |
| 119 | Moss Landing | 520.6 St | PAGE |
| 120 | Murphys (New) | 3.0 Hy | PAGE |
| 121 | Narrows | 9.4 Hy | PAGE |
| 122 | Needles | 1.1 IC | CAUC |
| 123 | Nimbus | 13.5 Hy | USBR |
| 124 | Oakland | 82.5 St | PAGE |
| 125 | Olinda | 80.0 St | PASA |
| 126 | Pardee | 15.0 Hy | EAMA |
| 127 | Parker | 120.0 Hy | USBR |
| 128 | Olancre | 75.0 St | PASA |
| 129 | Phoenix | 1.0 Hy | PAGE |
| 130 | Pilot Knob | 22.0 Hy* | IMID |
| 131 | Pit No. 1 | 66.0 Hy | PAGE |
| 132 | Pit No. 3 | 72.0 Hy | PAGE |
| 133 | Pit No. 4 | 90.0 Hy* | PAGE |
| 134 | Pit No. 5 | 120.0 Hy | PAGE |
| 135 | Pittsburgh | 625.0 St | PAGE |
| 136 | Pleasant Valley | 2.2 Hy* | LOAD |
| 137 | Poe | 129.2 Hy* | PAGE |
| 138 | Poole | 10.0 Hy | CAEP |
| 139 | Portal | 10.0 Hy* | SCEC |

| Plant Number | Name of Plant | Mw Capacity and Type | Utility Abbreviations |
|---|---|---|---|
| | **CALIFORNIA ( cont'd )** | | |
| 140 | Potero | 188.0 St | PAGE |
| 141 | Potter Valley | 9.0 Hy | PAGE |
| 142 | Power Drop No. 2 | 4.8 Hy | IMID |
| 143 | Power Drop No. 4 | 15.0 Hy | IMID |
| 144 | Redondo Beach | 270.0 St | SCEC |
| 145 | Rock Creek | 113.4 Hy | PAGE |
| 147 | Rush Creek | 6.4 Hy | CAEP |
| 148 | Salt Springs | 38.1 Hy | PAGE |
| 149 | Samoa | 5.0 St | HALC |
| 150 | San Bernardino | 60.0 St* | CAEP |
| 151 | San Fernando | 5.0 Hy | LOAD |
| 152 | San Francisquito No. 1 | 56.1 Hy | LOAD |
| 153 | San Francisquito No. 2 | 92.0 Hy | LOAD |
| 154 | San Gorgonio | 0.8 Hy | CAEP |
| 155 | San Gorgonio No. 1 | 1.5 Hy | CAEP |
| 156 | San Joaquin No. 2 | 2.4 Hy | PAGE |
| 157 | San Joaquin No. 3 | 4.0 Hy | PAGE |
| 158 | Santa Ana River No. 1 | 3.9 Hy | SCEC |
| 159 | Santa Ana River No. 2 | 1.4 Hy | SCEC |
| 160 | Santa Ana River No. 3 | 1.7 Hy | SCEC |
| 161 | Santa Susana | 7.5 Hy* | SCEC |
| 162 | Scattergood | 135.0 St* | LOAD |
| 163 | Seal Beach | 66.0 St | LOAD |
| 164 | Shasta | 375.0 Hy | USBR |
| 165 | Siphon Drop | 1.6 Hy | USBR |
| 166 | Silver Gate | 185.0 St | SADG |
| 167 | South | 4.0 Hy | PAGE |
| 168 | Spaulding No. 1 | 6.4 Hy | PAGE |
| 169 | Spaulding No. 2 | 8.6 Hy | PAGE |
| 170 | Spaulding No. 3 | 6.3 Hy | PAGE |
| 171 | Spring Gap | 6.0 Hy | PAGE |
| 172 | Stanislaus | 28.0 Hy | PAGE |
| 173 | Station "B" | 90.0 St | SADG |
| 174 | Tiger Creek | 51.0 Hy | PAGE |
| 175 | Tule | 4.8 Hy | PAGE |
| 176 | Tuttuck | 17.2 Hy | OAKJ |
| 177 | Trona | 28.5 St | AMPC |
| 178 | Union Lumber Co. | 8.0 St | UNLC |
| 179 | Upper Gorge | 37.5 Hy | LOAD |
| 180 | Vallecitos | 8.0 Hy* | PAGE |
| 181 | Valley | 512.5 St | LOAD |
| 182 | Vernon City | 25.0 IC | VECI 3/ |
| 183 | Volta | 6.4 Hy | PAGE |
| 184 | West Point | 15.8 Hy | PAGE |
| 185 | West Side Mill | 2.3 St | WCSL |
| 186 | Westwood | 2.5 St | PINE |
| 187 | Willow Branch | 1.1 St | WIRC |
| 188 | Wise | 12.0 Hy | PAGE |
| 189 | Yosemite | 2.0 Hy | YOSP |
| 190 | Broadway | 80.0 St | PASA |
| | **NEVADA** | | |
| 1 | Clark | 99.0 St | SCEP |
| | | 66.0 St* | SCEP |
| 2 | Elko | 4.1 IC | ELEP |
| 3 | Fleish | 2.0 Hy | SIPP |
| 4 | Northerne | 2.2 IC | SPPC |
| 5 | Hoover | 577.5 Hy Nev. | USBR |
| | | 867.5 Hy Ariz. | 4/ |
| 6 | Lahontan | 2.0 IC | TRCI 5/ |
| | | 1.0 Hy | TRCI 5/ |
| 7 | Lamoille | 0.2 Hy | ELEP |
| 8 | McGill | 5.0 Hy | ESEC |
| | | 45.0 St | ESEC |
| 9 | Reno | 0.7 IC | SIPP |
| | | 0.7 Hy | SIPP |
| 10 | Verdi | 2.4 Hy | SIPP |
| 11 | Washoe | 1.0 Hy | SIPP |
| 12 | Winnemucca | 0.1 Hy | CAUC |
| | | 1.0 IC | CAUC |

**FOOTNOTES**

1/ Leased from former principal stockholders of Arizona Power Company through Valley National Bank of Phoenix, Arizona as agent.

2/ Leased to Southern California Edison.

3/ Owned by Arkansas Valley Generating and Transmission, Inc. and leased to Southern Colorado Power Co.

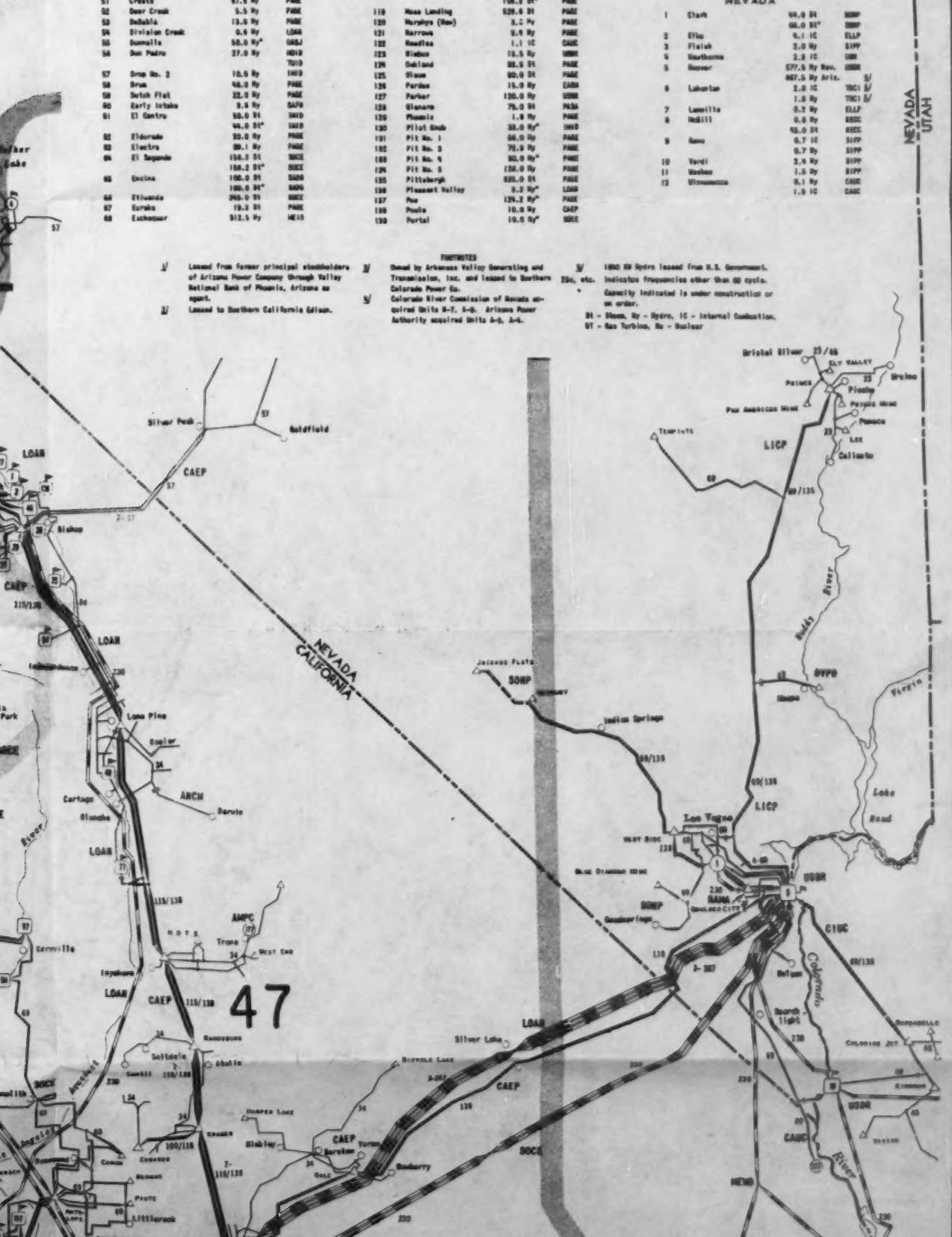
4/ Colorado River Commission of Nevada acquired Units A-7, A-8. Arizona Power Authority acquired Units A-5, A-6.

5/ 1940 KW Hydro leased from U.S. Government.

25c, etc. Indicates frequencies other than 60 cycle.

* Capacity indicated is under construction or on order.

St - Steam, Hy - Hydro, IC - Internal Combustion, GT - Gas Turbine, Nu - Nuclear


NEVADA
CALIFORNIA
NEVADA
UTAH
Silver Peak
Goldfield
CAEP
LOAD
Bishop
Lone Pine
Control
Cartago
Olancha
ARCH
Darwin
AMPC
Trona
West End
Inyokern
Coleville
Susanville
Honey Lake
Herlong
Alturas
Tuscarora
Klamath Falls
Malin
Round Mtn.
Olinda
Cottonwood
Redding
Table Mtn.
Oroville
Pittsburg
Contra Costa
Tesla
Newark
Moss Landing
Gates
Midway
Los Banos
Panoche
Coalinga
Helm
Kern
Kern River
Kern Canyon
Magunden
Edison
Laguna Bell
Long Beach
Mesa
Lighthipe
Sylmar
Pardee
Haiwee
Inyo
Lone Pine
Control
Cartago
Olancha
Darwin
Bishop
Big Creek
Eastwood
Balch
Kerckhoff
Coalinga
Helm
Gates
Midway
Los Banos
Panoche
Moss Landing
Metcalf
Oakland
Ravenswood
Newark
Tesla
Contra Costa
Pittsburg
Cottonwood
Olinda
Redding
Table Mtn.
Oroville
Pit No. 1
Pit No. 3
Pit No. 4
Pit No. 5
Round Mtn.
Malin
Klamath Falls
Tuscarora
Alturas
Herlong
Honey Lake
Susanville
Coleville
Inyokern
Haiwee
Pardee
Sylmar
Mesa
Lighthipe
Laguna Bell
Long Beach
Edison
Magunden
Kern Canyon
Kern River
Kern
Bakersfield
Midway
Gates
Helm
Coalinga
Panoche
Los Banos
Gregg
Wilson
Warnerville
Melones
Tulloch
Stanislaus
Tiger Creek
Salt Springs
Valley Springs
Rock Creek
Curtis
Drum
Spaulding
Summit
Colgate
Narrows
Dixon
Vaca
Cortina
Eagle Rock
Cottonwood
Red Bluff
Olinda
Table Mtn.
Oroville
Palermo
Pease
Marysville
Brighton
Rio Oso
Lincoln
Gold Hill
Placer
Penryn
Newcastle
Auburn
Folsom
Natomas
Elverta
Rancho Seco
Lodi
Stockton
Tesla
Newark
Ravenswood
Metcalf
Moss Landing
Gates
Midway
Los Banos
Panoche
Coalinga
Helm
Kern
Kern River
Kern Canyon
Magunden
Edison
Laguna Bell
Long Beach
Mesa
Lighthipe
Sylmar
Pardee
Haiwee
Inyo

## LEGEND

### GENERATING STATIONS

| 200,000 KW AND MORE | 25,000 TO 199,999 KW | 24,999 KW AND LESS | |
|---|---|---|---|
| (8) | (20) | (5) | Fuel (Numbers in symbols refer to Plant list) |
| [25] | [1] | [12] | Hydro |

FEDERAL ⚑ NON-FEDERAL ⚑ Publicly owned; Federal, Non-Federal

○ Under construction

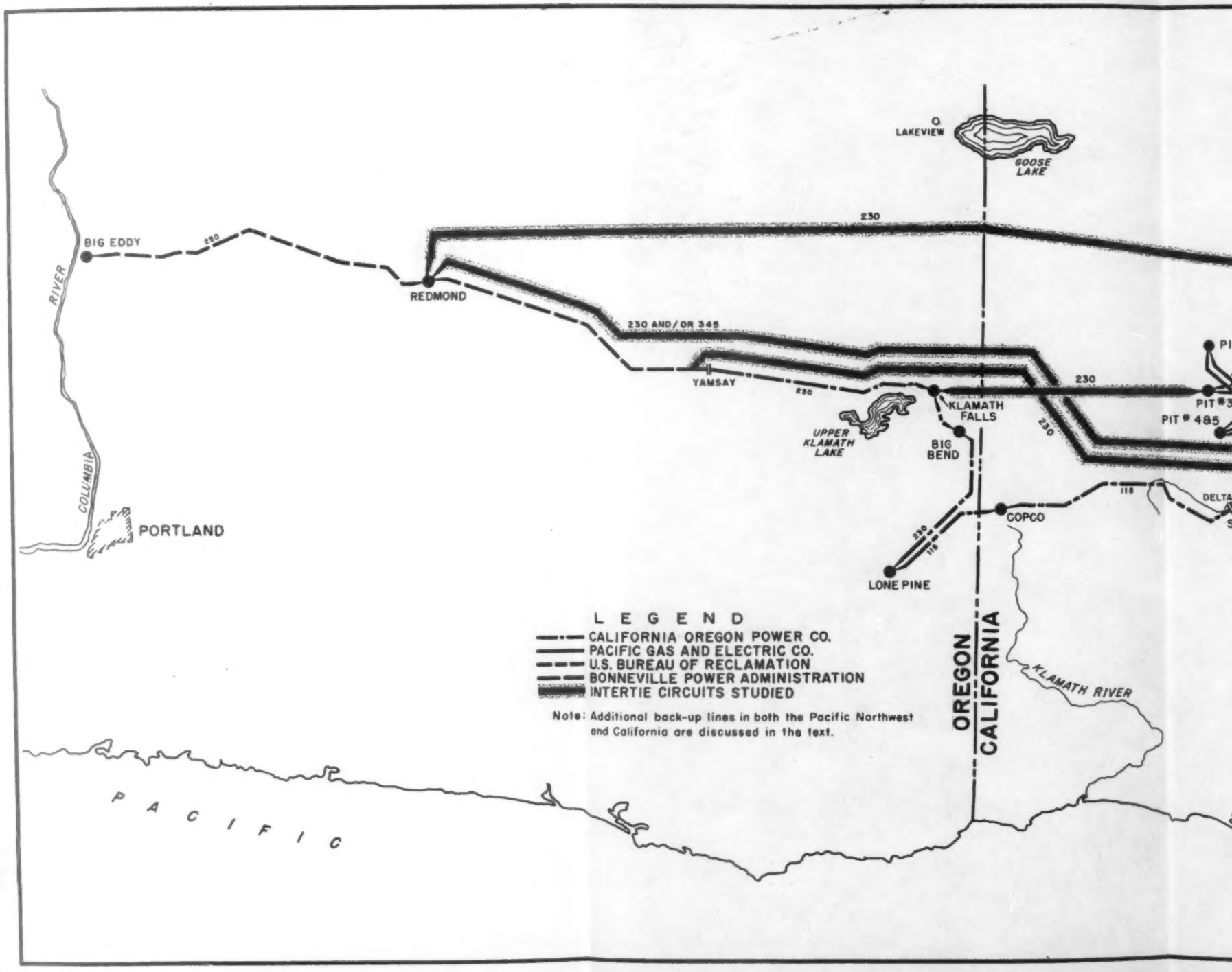
△ TRANSMISSION △ DISTRIBUTION Substations; transmission, distribution
Transmission substations shown where there is a change in voltage only.
Distribution substations omitted when they coincide with town symbol.

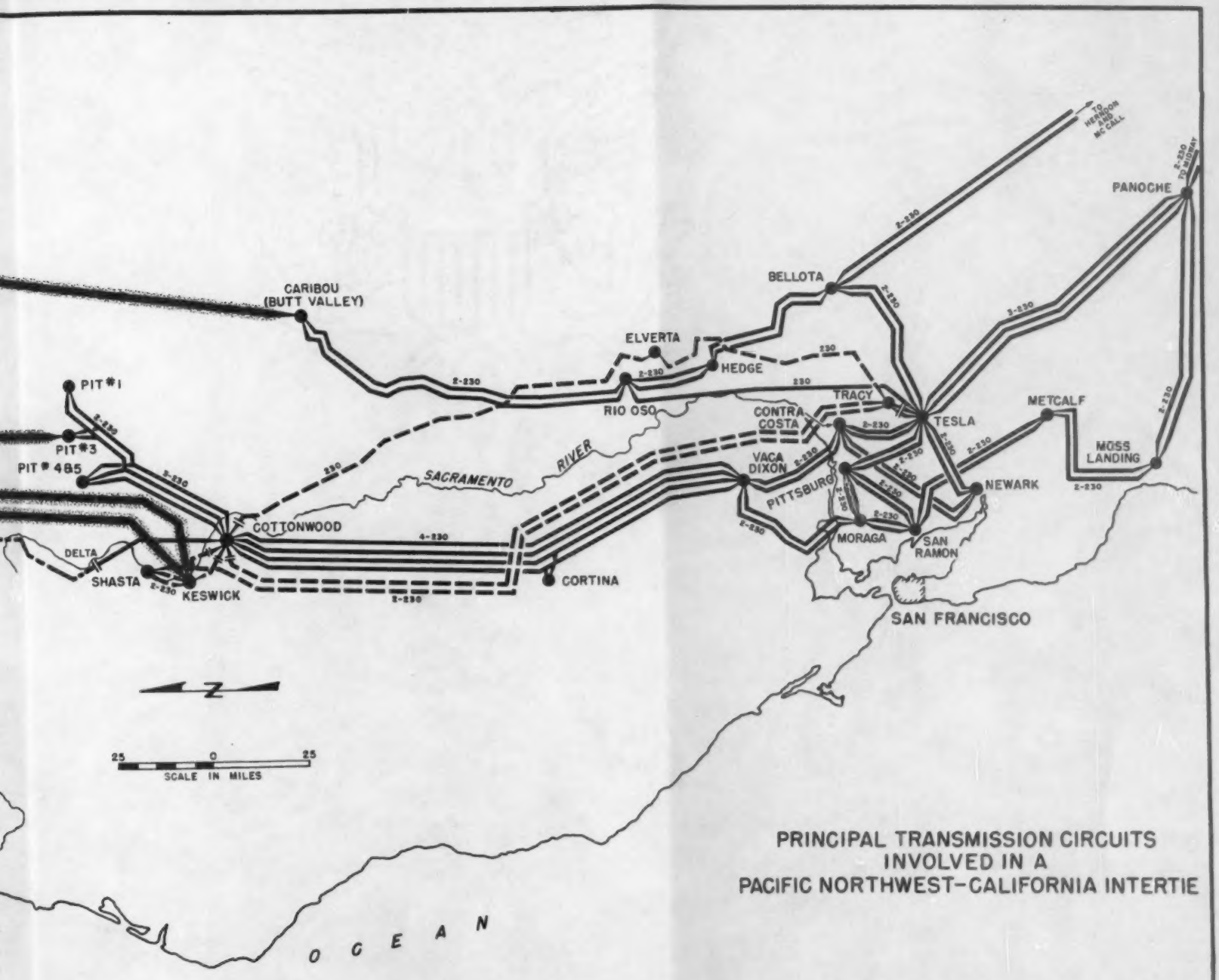
### TRANSMISSION LINES *(Nominal operating voltages indicated in thousands of volts)*

- 189,000 volt circuit and more
- 80,000 to 188,000 volts
- 58,000 to 79,000 volts
- 57,000 volt circuit and less — line facilities below 22,000 volts are generally omitted even though they are used to serve towns
- Underground and submarine cable
- Under construction
- 25 — Frequency other than 60 cycle
- FACO ALRR — Connection between companies (Abbreviations refer to company list)
- Crossover, connecting lines

# CALIFORNIA TRANSMISSION SYSTEM

| | | | | |
|---|---|---|---|---|
| 51 | Cresta | 67.5 Hy | PGAE | |
| 52 | Bear Creek | 5.5 Hy | PGAE | |
| 53 | DeSabla | 13.0 Hy | PGAE | |
| 54 | Division Creek | 8.6 Hy | LOAD | |
| 55 | Burnells | 50.0 Hy* | OAKJ | |
| 56 | San Pedro | 37.5 Hy | HOHD | |
| | | | TUID | |
| 57 | Drop No. 2 | 15.0 Hy | IMID | |
| 58 | Drum | 46.0 Hy | PGAE | |
| 59 | Dutch Flat | 22.0 Hy | PGAE | |
| 60 | Early Intake | 3.6 Hy | GAPA | |
| 61 | El Centro | 50.0 St | IMID | |
| | | 94.0 St* | IMID | |
| 62 | Eldorado | 20.0 Hy | PGAE | |
| 63 | Electra | 80.1 Hy | PGAE | |
| 64 | El Segundo | 156.3 St | SOCE | |
| | | 156.2 St* | SOCE | |
| 65 | Encina | 108.0 St | SADG | |
| | | 108.0 St* | SADG | |
| 66 | Etiwanda | 248.0 St | SOCE | |
| 67 | Eureka | 15.3 St | PGAE | |
| 68 | Exchequer | 312.5 Hy | MERD | |
| 69 | Fairview | 1.5 Hy | PGAE | |
| 70 | Fall River | 4.0 Hy | PGAE | |
| 71 | Feather River | 6.0 Hy | PGAE | |
| 72 | Fiddletown | 2.0 Hy | PGAE | |
| 73 | Fifteen Mile Falls | 4.0 Hy | PGAE | |
| 74 | Fish Creek | 1.0 Hy | PGAE | |
| 75 | Flume No. 1 | 1.0 Hy | PGAE | |
| 76 | Flume No. 2 | 1.0 Hy | PGAE | |
| 77 | Foothill | 1.5 Hy | PGAE | |
| 78 | Forbestown | 1.5 Hy | PGAE | |
| 79 | Fordyce | 10.0 Hy | SCPP | |
| 80 | Forebay | 1.0 Hy | PGAE | |
| 81 | Forest Hill | 1.0 Hy | PGAE | |
| 82 | Fort Jones | 1.0 Hy | PGAE | |
| 83 | Fountain Springs | 1.0 Hy | SCE | |
| 84 | Franklin | 1.0 Hy | LOAD | |
| 85 | Friant | 25.0 Hy | USBR | |
| 86 | Gaskill | 1.0 Hy | PGAE | |
| 87 | Gerber | 1.0 Hy | PGAE | |
| 88 | Geysers | 11.0 St | GEYS | |
| 89 | Glenburn | 1.0 Hy | PGAE | |
| 90 | Glenn | 1.0 Hy | PGAE | |
| 91 | Grand Valley | 1.0 Hy | PGAE | |
| 92 | Grant | 1.0 Hy | PGAE | |
| 93 | Grass Valley | 1.0 Hy | PGAE | |
| 94 | Grayson | 1.0 Hy | PGAE | |
| 95 | Green Valley | 1.0 Hy | PGAE | |
| 96 | Grizzly | 1.0 Hy | PGAE | |
| 97 | Grizzly Creek | 1.0 Hy | PGAE | |
| 98 | Grizzly Forebay | 1.0 Hy | PGAE | |
| 99 | Grizzly Powerhouse | 1.0 Hy | PGAE | |
| 100 | Grizzly Valley | 1.0 Hy | PGAE | |
| 101 | Gualala | 1.0 Hy | PGAE | |
| 102 | Haas | 1.0 Hy | PGAE | |
| 103 | Hamilton Branch | 1.0 Hy | PGAE | |
| 104 | Hat Creek No. 1 | 1.0 Hy | PGAE | |
| 105 | Hat Creek No. 2 | 1.0 Hy | PGAE | |
| 106 | Haypress | 1.0 Hy | PGAE | |
| 107 | Helms | 1.0 Hy | PGAE | |
| 108 | Hetch Hetchy | 1.0 Hy | PGAE | |
| 109 | Hoopa | 1.0 Hy | PGAE | |
| 110 | Horseshoe Bend | 1.0 Hy | PGAE | |
| 111 | Humboldt Bay | 1.0 Hy | PGAE | |
| 112 | Hyatt | 1.0 Hy | PGAE | |
| 113 | Iron Canyon | 1.0 Hy | PGAE | |
| 114 | Jackson | 1.0 Hy | PGAE | |
| 115 | Jackson Creek | 1.0 Hy | PGAE | |
| 116 | Jackson Creek No. 1 | 1.0 Hy | PGAE | |
| 117 | Jackson Creek No. 2 | 1.0 Hy | PGAE | |
| 118 | Kern Canyon | 1.0 Hy | PGAE | |
| 119 | Kerckhoff | 1.0 Hy | PGAE | |
| 120 | Kerckhoff No. 2 | 1.0 Hy | PGAE | |
| 121 | Kern River No. 1 | 1.0 Hy | PGAE | |
| 122 | Kern River No. 2 | 1.0 Hy | PGAE | |
| 123 | Kern River No. 3 | 1.0 Hy | PGAE | |
| 124 | Kilarc | 1.0 Hy | PGAE | |
| 125 | Kings River | 1.0 Hy | PGAE | |
| 126 | Kings River No. 2 | 1.0 Hy | PGAE | |
| 127 | Kings River No. 3 | 1.0 Hy | PGAE | |
| 128 | Kings River No. 4 | 1.0 Hy | PGAE | |
|


LAKEVIEW
GOOSE LAKE
230
BIG EDDY
230
RIVER
REDMOND
230 AND/OR 345
YAMSAY
230
230
KLAMATH FALLS
UPPER KLAMATH LAKE
BIG BEND
230
PIT #3
PIT #4&5
COLUMBIA
PORTLAND
COPCO
118
DELTA
230
118
LONE PINE
LEGEND
CALIFORNIA OREGON POWER CO.
PACIFIC GAS AND ELECTRIC CO.
U.S. BUREAU OF RECLAMATION
BONNEVILLE POWER ADMINISTRATION
INTERTIE CIRCUITS STUDIED
Note: Additional back-up lines in both the Pacific Northwest and California are discussed in the text.
OREGON
CALIFORNIA
KLAMATH RIVER
PACIFIC




# PRINCIPAL TRANSMISSION CIRCUITS INVOLVED IN A PACIFIC NORTHWEST–CALIFORNIA INTERTIE

JAN. 29, 1960
111641

Annual Benefit (Millions of dollars)

* For
see

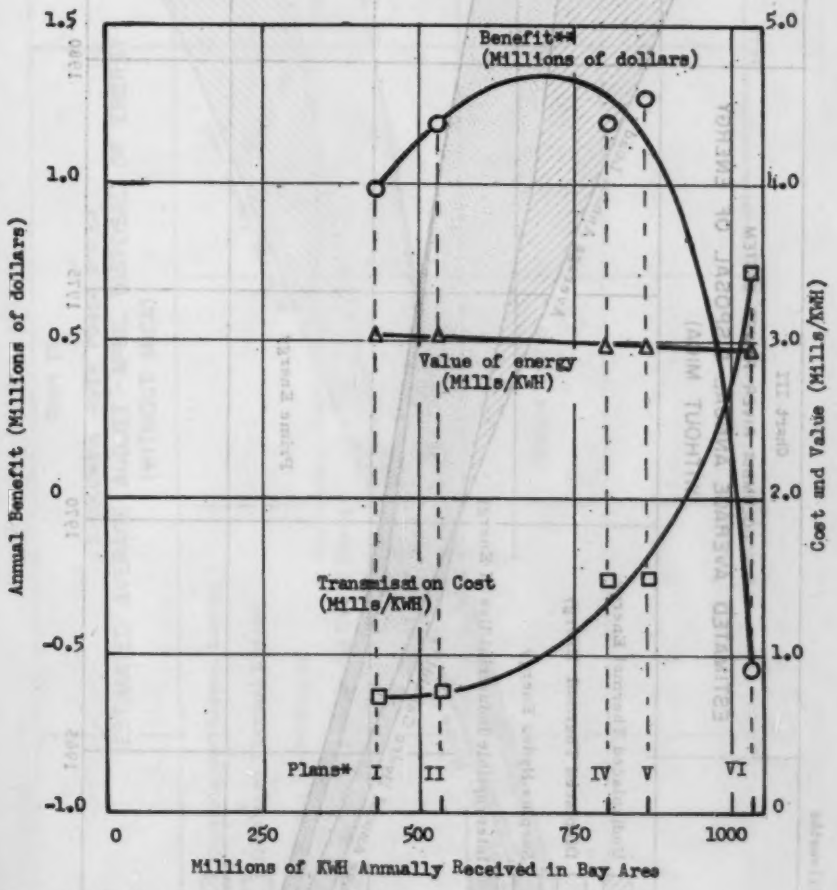
**Tota
ann

CHART II

ECONOMIC FEASIBILITY

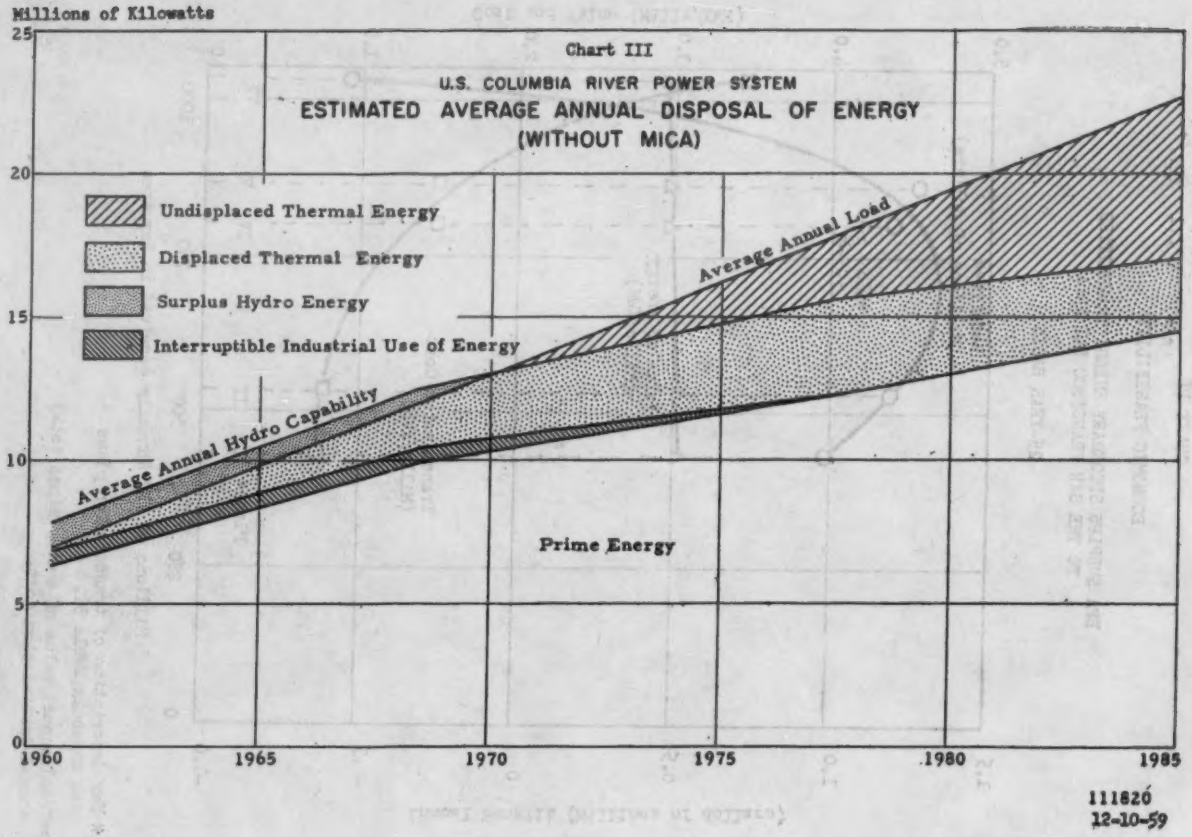
BPA SURPLUS SECONDARY ENERGY TRANSMITTED
TO THE SAN FRANCISCO BAY AREA

25-YEAR BASIS

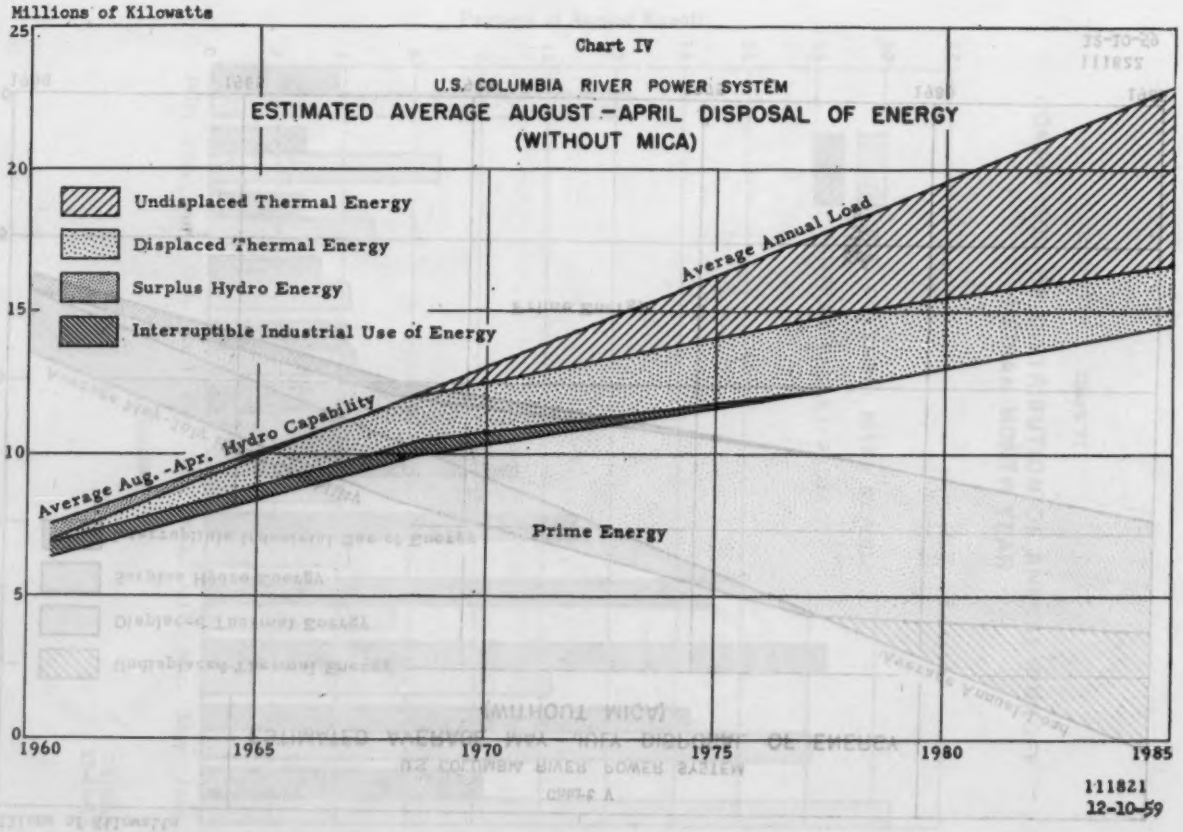


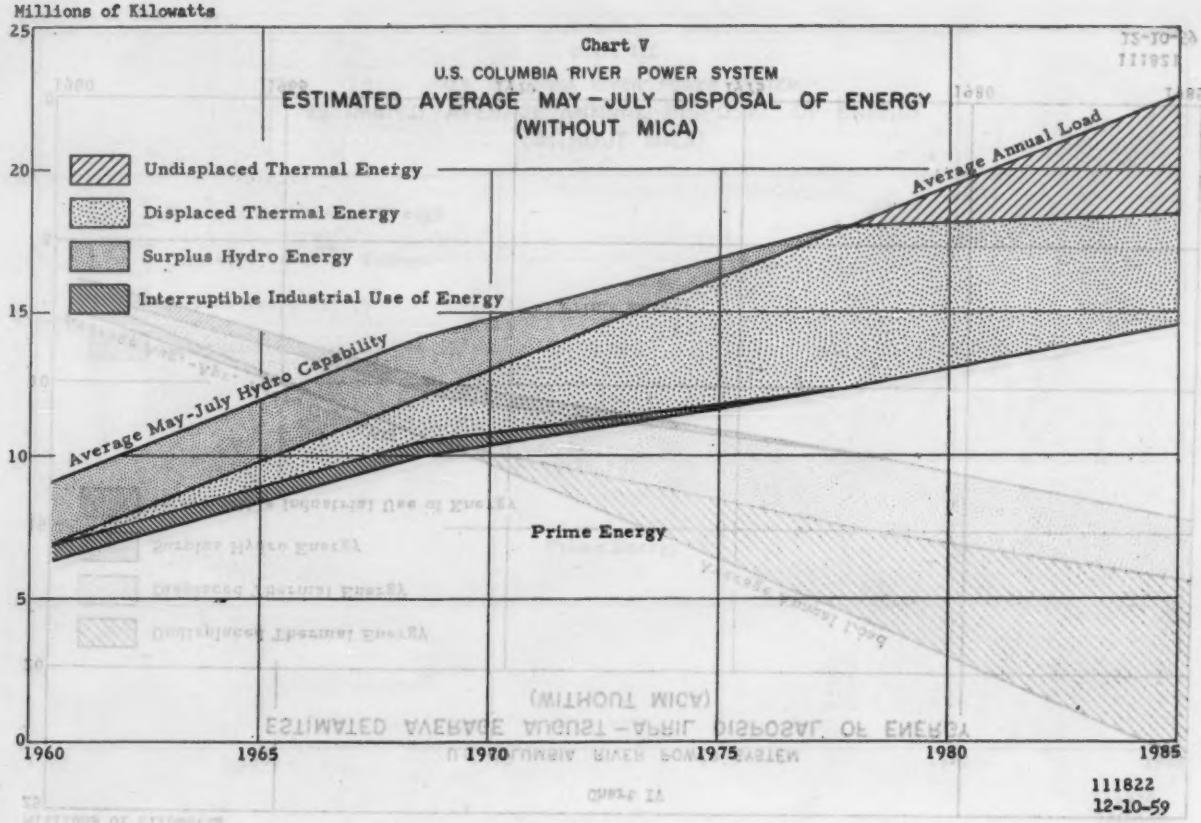

* For description of transmission plans see appendix Table 31.

**Total annual value of energy minus total annual transmission cost.




Millions of Kilowatts

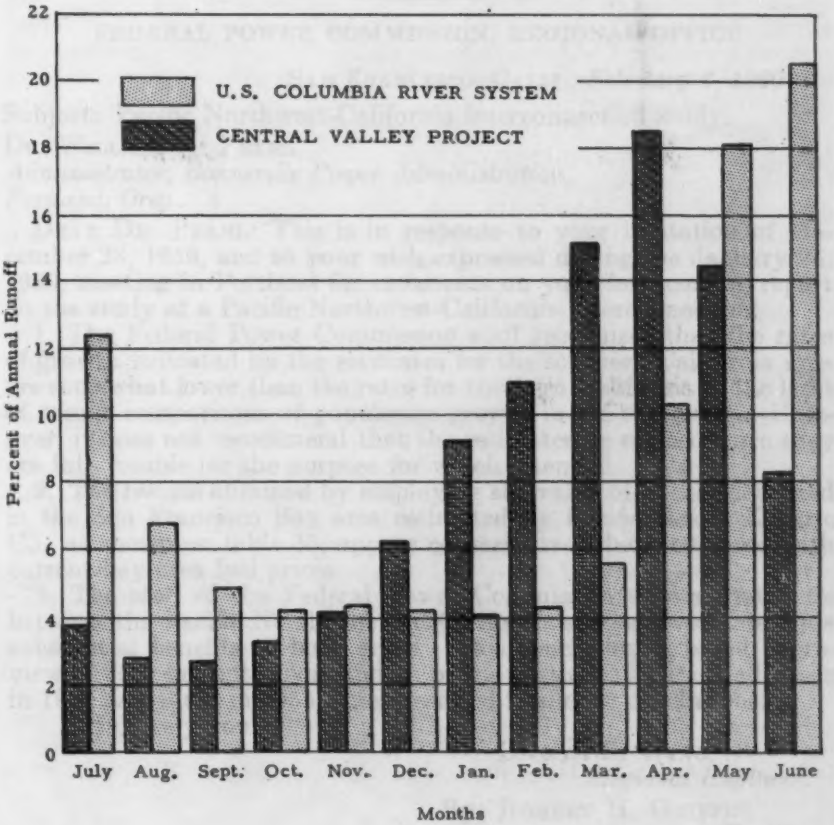

Millions of Kilowatts
25
20
15
10
5
0
Chart IV
U.S. COLUMBIA RIVER POWER SYSTEM
ESTIMATED AVERAGE AUGUST – APRIL DISPOSAL OF ENERGY
(WITHOUT MICA)
Undisplaced Thermal Energy
Displaced Thermal Energy
Surplus Hydro Energy
Interruptible Industrial Use of Energy
Average Annual Load
Average Aug.-Apr. Hydro Capability
Prime Energy
1960
1965
1970
1975
1980
1985
111821
12-10-59



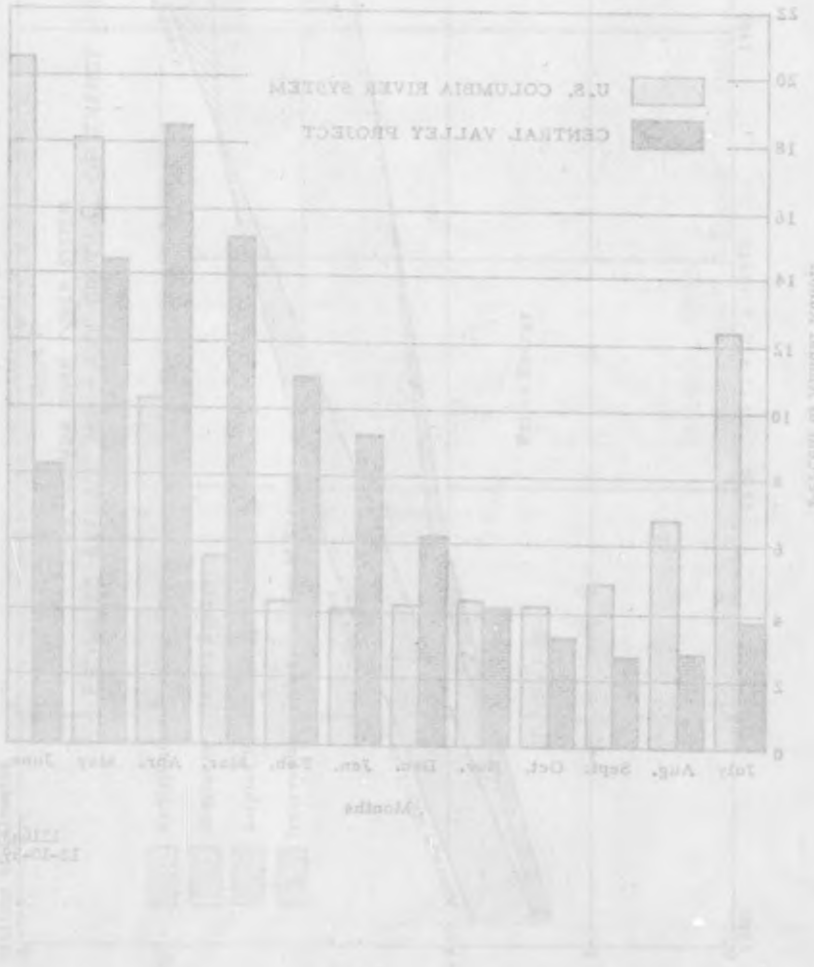

Percent of Annual Runoff

Chart VI

## COMPARISON OF DISTRIBUTION OF ANNUAL RUNOFF
## MEDIAN MONTH YEAR




111643
12-10-59


U.S. COLUMBIA RIVER SYSTEM
CENTRAL VALLEY PROJECT
Percent of Annual Runoff
Months
July
Aug.
Sept.
Oct.
Nov.
Dec.
Jan.
Feb.
Mar.
Apr.
May
June

# APPENDIX OF COMMENTS

## COMMENTS SUBMITTED BY MEMBERS OF CONSULTATION COMMITTEE

FEDERAL POWER COMMISSION, REGIONAL OFFICE

SAN FRANCISCO, CALIF., *February 2, 1960.*

Subject: Pacific Northwest-California interconnection study.

DR. WILLIAM A. PEARL,
*Administrator, Bonneville Power Administration,*
*Portland, Oreg.*

DEAR DR. PEARL: This is in response to your invitation of December 23, 1959, and to your wish expressed during the January 25, 1960, meeting in Portland for comments on your forthcoming report on the study of a Pacific Northwest-California interconnection.

1. The Federal Power Commission staff recognizes that the rates of growth indicated by the estimates for the southern California area are somewhat lower than the rates for northern California in the light of recent comparisons of population growth in the two areas. However, it does not recommend that the estimates be revised since they are fully usable for the purpose for which intended.

2. The results obtained by employing the value of energy delivered in the San Francisco Bay area estimated by Pacific Gas & Electric Co., as shown on table 35, appear conservative when compared with current bay area fuel prices.

3. The staff of the Federal Power Commission agrees that a tie between the Pacific Northwest and California systems would provide substantial benefits to both areas. This conclusion is based on review of your present report and on previous studies by the staff made in 1950 and again in 1953 which resulted in similar conclusions.

Sincerely yours,

LESHER S. WING,
*Regional Engineer.*

By: ROBERT H. GRIFFIN,
*Deputy.*

STATE OF CALIFORNIA

GOVERNOR'S OFFICE,
*Sacramento, Calif., January 21, 1960.*

Dr. WILLIAM A. PEARL,
*Administrator, Bonneville Power Administration,*
*Portland, Oreg.*

DEAR DR. PEARL: On December 23, 1959, you transmitted to the State of California copies of a preliminary draft of a study of an interconnection between the Pacific Northwest and California and invited the State's comments. The study, representing several months' work, is some 60 pages in length accompanied by an equal volume of tables and charts. Although members of the staff of the department of water resources assisted in the development of information regarding California's loads and resources, the State has not otherwise participated in the study. In the relatively short time made available for comment it has not been possible to fully analyze your report. This will require additional time, including an opportunity to review the supporting data. It is California's intention to proceed, in cooperation with the other States, with a thorough analysis of your study and to make its own independent evaluation of a Northwest intertie with particular emphasis on the use of ultra-high-voltage lines and their construction as common carriers.

It is the State's tentative view that your preliminary draft represents an overly conservative appraisal of a resource development which holds tremendous potential. Also, we hold doubts whether all of the possible benefits have been fully and properly evaluated. We shall be surprised if a broader approach will not justify a much heavier intertie providing for larger flows of power and greater benefits. In this observation I would emphasize that Governor Brown is fully aware of the preference problem concerning the Northwest and its desire to preserve a first priority in the use of any power needed in the area. California is fully sympathetic with this point of view and believes that adequate protection can be afforded through legislation.

There follows a brief discussion of your preliminary draft covering the points presented in the same order as they are incorporated in your study. Because of time limitations these observations also must be considered as preliminary and incomplete.

*Loads and resources*

The load resources estimates for the Pacific Northwest used in the report indicate substantially less surplus power available for export than was previously shown for comparable levels of development in a presentation by Mr. D. S. Campbell, Chief, Division of Power, Bureau of Reclamation, Department of the Interior, on April 8 and 9, 1959, before the Subcommittee on Irrigation and Reclamation of the Senate Committee on Interior and Insular Affairs. There was not sufficient time or information available to check on the basis or accuracy of the reduced power load and resource estimate.

The availability of surplus Northwest power might permit improved operation of hydro storage in California in situations where releases would be made for power generation only. The possibility of using surplus Northwest power in these situations in order to conserve water in California for future use does not appear to have been examined.

The validity of rejecting the possible marketing of surplus power in southern California solely on the basis of an assumed high loss is questioned. Since the entire amount of power would be lost if not transported to California, the loss factor in itself may not be decisive. Further, no serious consideration was given to ultra-high-voltage transmission lines which would drastically reduce losses.

*Coordination*

The study concludes that no "firm benefits" will flow to either the Central Valley project or Bonneville through exchange of surplus energy only. It appears probable that the analysis failed to consider full use of Northwest energy using the present P.G. & E.-CVP operating contract as a base. It would be appropriate to assume full integration by P.G. & E. of Bonneville energy along with CVP energy as a logical extension of the present arrangement. With such integration additional energy need not be available from the Northwest at the precise times when CVP is now short. This area bears further detailed examination.

*National defense*

It is stated that during a national emergency off peak fuel generation in northern California could be used to firm up some uninterruptible loads in the Northwest. This would appear to be a valuable and measurable function available under peacetime conditions as well. Although it may be difficult to place a specific value on national defense aspects of the intertie, its importance is not adequately stressed in the study. This factor would gain in importance with the construction of a higher capacity interconnection. The potential national defense value of an extra high voltage, high capacity line to southern California was given no consideration.

*Economic feasibility and financial feasibility*

The report examines the economic and financial feasibility of several alternative plans but concludes that only one 230-kilovolt line is financially feasible. This is based on the assumption that Bonneville Power Administration will sell the surplus energy at its presently established rates. Departure from this arbitrary position that financial feasibility is bound to application of current rate schedules would permit evaluation in accordance with criteria prescribed in the publication, "Proposed Practices for Economic Analysis of River Basin Projects," published by the Subcommittee on Evaluation Standards of the Interagency Committee on Water Resources, dated May 1958 (the Green Book).

Benefits assumed are based entirely on savings obtained from backing off of steam generation in the San Francisco Bay area. Consideration has not been given to the possibility of backing off the higher cost steam generation in the Humboldt Bay area in northern California as well as the southern California area.

No credit has been taken for reduction in reserve capacity in either area. An adequate interconnection should result in reduction of the overall reserve capacity requirements.

The amount of energy transferable over the interconnection is determined by multiplying the availability factor by the acceptability factor to obtain a capacity factor. The report states that the validity of the practice was confirmed by a special analysis, but the

analysis is not included in the report. We have reservations concerning the use of this method since it tends to penalize higher interconnection capacities or any conditions in which the availability and acceptability factors are low.

The report analyzes several interconnection levels on a basis incremental to the recommended single 230-kilovolt interconnection which show incremental benefit-cost ratios greater than 1 to 1. Further consideration should be given to recommendation of additional lines on the basis of the "Green Book" criteria (pp. 12–13) stating: "Net benefits are maximized if the scale of the development is extended to the point where benefits added by the last increment of scale or scope are equal to the costs of adding that increment."

No consideration was given to the benefits which would derive from a common carrier line to provide an early market for proposed hydrodevelopments by non-Federal agencies in the Northwest. The financial feasibility of such projects often are materially enhanced by marketing surplus capacity in the early years of such a development before local load completely absorbs the resource.

By adding California load growth to that of the Northwest load, new Northwest projects—Federal and non-Federal—could be fully loaded in a much shorter time and thus improve earlier revenues and economic feasibility. The output could be sold in California as firm power to be withdrawn for use of the Pacific Northwest on an agreed schedule based on short-term load growth forecast. This would be particularly true if the interconnecting line was a common carrier and available to all sources of generation and load. Even if the primary effect of selling such power in California would be to postpone investment in new steam generating facilities, such an arrangement would result in significant benefits to both areas attributable to a high capacity interconnection.

*Conservation*

The report does not consider the conservation benefit deriving from storing natural gas underground in California gasfields. The cost of diversion storage of gas could be offset by a special rate schedule for low priority power. This would permit efficient pipeline loadings and might also reserve natural gas for higher uses. The report should tabulate the amounts of fuel conserved by large capacity interconnections as well as the small capacity one. This may have important national defense aspects as well as general economic significance.

*Rights of preference customers*

The report should state that, by appropriate legislation modifying the preference provisions of the Bonneville Project Act and through other means, guarantees could be put into effect to fully protect the Pacific Northwest. The report should emphasize that the State of California does not want any power needed by the Northwest at any time.

*Costs*

There has not been sufficient time or basic information available with which to check construction costs in detail, but the level of costs used appears to be considerably above average and higher than seem reasonable for the class of construction proposed. The method of estimating costs tends to bias the report toward the support of a small capacity intertie.

As stated in the opening of this letter, time has permitted only a rather cursory review of the intertie study. The State's complete report is underway but will not be finished for some weeks. It is understood that you are under commitment to transmit your study to the Senate Committee on Interior and Insular Affairs by February 15. California's comments will not be available prior to that date. Should you decide to send Bonneville's recommendations on to the Senate prior to the time the State's study is complete, California's report can be sent directly to the Senate committee.

Sincerely,

RALPH M. BRODY,
*Special Counsel to the Governor on Water Problems.*

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STATE OF IDAHO

DEPARTMENT OF RECLAMATION,
*Boise, January 15, 1960.*

Dr. WILLIAM A. PEARL,
*Administrator, Bonneville Power Administration,*
*Portland, Oreg.*

DEAR DR. PEARL: Governor Robert E. Smylie of Idaho has asked me to reply direct to you in response to your request of December 28, 1959, for comments of the State of Idaho on the proposal to make a high voltage connection between the Pacific Northwest and California.

I have reviewed the preliminary draft of the Bonneville Power Administration's study of the proposal and am impressed with the immense amount of data therein. Such a study and report certainly could have resulted from nothing less than a most thorough consideration of the many elements which may determine the power situation in the Pacific Northwest until the year 1970 and also until 1985.

It is understood that the Bonneville Power Administration today has and likely for some 10 years hence will have secondary power surplus to the Pacific Northwest demand. If temporary revenue from its transmission to California can be gained without a perpetual intertie with California, it appears to be a laudable objective.

However some possibilities of the intertie as outlined in the study and the resulting conclusions are being closely scrutinized by Idaho before it unqualifiedly agrees and approves the plan.

For example under the title "Loads and resources" the conclusion is reached that secondary energy from the Pacific Northwest is, or will be competitive only with thermal-electric plants in California.

Consider southern Idaho. Bonneville Power Administration has a connection with Idaho Power Co. at LaGrande, Oreg. Idaho Power Co. is tied with Utah Power & Light Co. in eastern Idaho. Utah Power & Light Co. has several thermal-electric plants in its generating system and being short of hydroelectric capacity obviously must resort to steam plants to meet its requirements. Both companies now have a large irrigation pumping load and a rapidly growing pumping load part of which may need be supplied by thermal-electric power. So if secondary hydroelectric power is competitive with thermal power in California it likewise should be competitive throughout southern Idaho.

Idaho's increase in irrigation pumping load has amounted to 250,000 horsepower in the last 10 years and the demand is increasing at an accelerated rate. So it is possible that secondary and surplus power from the Columbia River power system may be needed in Idaho in the near future if the State carries out its integration responsibilities to the Northwest Power Pool in holding reservoirs full for short water years and coordination requirements of Federal Power Commission licenses.

On page 3, second paragraph of the report, statement is made to the effect that on the assumption any secondary energy which could be used in the Pacific Northwest would be so used there rather than be exported to California, etc., etc.—the California market becomes limited to steam displacement. This appears to be only an assumption and performance might be otherwise.

Under the title of "Rights of preference customers" the matter of the perpetuity or otherwise of a preference customer contract with California gives concern to Idaho. As was believed before the Portland regional solicitor's opinion which bears out this belief was given, it appears to be fact under present law that preference or nonpreference customer contracts with California agencies would prevail over a requirement for such power in the Pacific Northwest and a need to withdraw it from California. It should be surprising if any Pacific Northwest State looks with favor upon this reality.

It appears from the report that some export of power to California is feasible without a large outlay of money for transmission. As transmission capacity increases so does the attendant cost and the benefit-cost ratio goes rapidly down. The study does not appear to suggest going to a large transmission capacity. Doing so would impose an investment upon the scheme which could not be justified unless a continuing power export is contemplated.

It is certain that Idaho will never approve of any plan of exporting Columbia Basin power to California unless it can be positively guaranteed that it can be withdrawn whenever needed in the Pacific Northwest States.

Sincerely yours,

GEO. N. CARTER,
*State Reclamation Engineer.*

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STATE OF MONTANA

STATE ENGINEER,
*Helena, Mont., February 4, 1960.*

Subject: Preliminary draft of "Study of a High Voltage Electrical Interconnection Between the Pacific Northwest and California."

Dr. WILLIAM PEARL,
*Administrator, Bonneville Power Administration,*
*Portland, Oreg.*

DEAR DR. PEARL: First, let me thank you very kindly for making available to us in Montana copies of the preliminary draft of the "Study of a High Voltage Electrical Interconnection Between the

Pacific Northwest and California." This has been studied very carefully. You and the subcommittee did a remarkable job in spite of the short time available to collect the data.

We, in Montana, are interested in preserving the power resources of the Columbia Basin for use in the Pacific Northwest. We are not, however, opposed to selling surplus power outside of the Bonneville service area providing such power can be withdrawn for use within the Pacific Northwest when and if a shortage should occur therein. It appears from the report that if the BPA should extend a tie line into California this would extend the service area and include with it the opportunity to connect preferred customers in California. We would be opposed to serving preferred customers in the California area because by so doing it would not be possible to shut the power off from such customers for use in the Pacific Northwest if there should be a shortage of power.

If an extension of the line should be made into California and preferred customers attached thereto and a shortage of generating capacity occur in the Pacific Northwest then BPA would be penalized by having to supply steam power in addition to its hydropower.

It appears to us that it would not be a sound investment for the BPA to finance a tie into California on account of the following contingencies:

1. There is no assurance that excess power will be available for sale in the California area over a very long period of time.

2. There is no assurance that BPA will have an abundance of streamflow to operate hydroplants to full capacity. A series of dry years could shut off completely the delivery of excess power to California.

3. In case of low streamflows it may be necessary to connect steamplants into the system to deliver the firm contract loads.

4. To amortize the capital investment with interest and to provide for operation and maintenance costs would entail a yearly sum which would require a fairly dependable income from the sale of California power to justify the extension of such a tieline.

Summing up our views on the subject we are in this position:

1. We do not oppose the sale of surplus power to California.

2. We are opposed to connecting preferred customers on the California tie.

3. Any surplus power sold to California must be contracted on the basis that it can be withdrawn any time such power is needed in the Pacific Northwest.

4. We are doubtful about the financial feasibility of a tieline into California.

5. If a tieline should be built into California and it is necessary to enact new legislation to protect BPA from signing preferred customers in California, we are favorable to such new legislation in order to protect the interests of the Pacific Northwest.

Very truly yours,

FRED E. BUCK,

*State Engineer of Montana and Member of the Consultation Committee on the Pacific Northwest California Intertie.*

STATE OF OREGON

PUBLIC UTILITY COMMISSIONER,
*Salem, Oreg., January 7, 1960.*

Dr. WM. A. PEARL,
*Administrator, Bonneville Power Administration,*
*Portland, Oreg.*

DEAR DR. PEARL: The Governor of Oregon submitted to the attorneys general of Oregon, Washington, and California through their respective Governors the following 12 legal questions pertaining to this study. A capsule of the opinions of the three attorneys general is included for your information. My capsule summary is for information purposes and does not pretend to adequately state the legal position of the attorney general of any one of the States.

1. Is there any limitation on the marketing area of the BPA inherent in the statute?

Answer. No. The power of BPA to sell "within economic transmission distance" is a physical, budgetary, technological and economic limitation rather than a statutory geographical limitation.

2. What is the legal relationship between the Bonneville Power Administration marketing area and the area of operation of the preference clause?

Answer. The preference operates wherever the marketing area is extended.

3. Does the marketing area of BPA follow the sale of power and if so does the boundary contract when an area is no longer served?

Answer. Yes to both parts.

4. Can the operation of the preference clause be waived by contract between Bonneville and a public buyer?

Answer. No; probably contrary to public policy, in addition the statute decrees BPA "shall" give preferences to the public bodies and therefore the administrator could not recognize an attempted waiver.

5. Where Bonneville sells power to a nonpreference buyer and this buyer in turn sells it or wheels it for a preference type buyer, does the preference clause attach?

Answer. If BPA sells to a nonpreference buyer which in turn sells to a public body no preference attaches. However, a utility over whose lines electric energy is "wheeled" is neither purchaser nor seller. Therefore, if BPA sells to a public body and energy is wheeled over a nonpreference utility's lines, a preference would exist.

6. What would be the effect on the marketing area and the operation of the preference clause of a Bureau of Reclamation line in California tying into a BPA line at the Oregon-California border?

See answer to question 9.

7. What would be the effect on the marketing area and the operation of the preference clause of a Bureau of Reclamation line in California tying into an Oregon State built line providing a connection with BPA?

See answer to question 9.

8. What would be the effect on the marketing area in the operation of the preference clause on the Bureau of Reclamation line in California tying into a privately built line in Oregon connected with BPA?

See answer to question 9.

9. What would be the effect of the marketing area and the operation of the preference clause with a Bureau of Reclamation line in California tying into a line at the Oregon border which was partly built by private power companies and partly built by public bodies connected with BPA?

Answer. Federal agencies are not "public bodies" within the definition in the statute and therefore are entitled to no preference. Bonneville may "interchange electric energy" and "interconnect" with other Federal projects. Existence or nonexistence of preference does not depend on ownership of lines, rather whether the power is purchased from the owner of lines or wheeled for the public body which purchases from BPA.

10. What is the best course of action to be pursued by the States to formalize and carry into execution the agreement reached by the Governors of California, Oregon and Washington, to wit: that California would not assert a preference right, in competition with Northwest power users, and to make this agreement legal and binding not only on California but public power agencies in California and the Bonneville Power Administration as well?

Answer. California and Oregon—congressional amendment of the law. See also comments on question (1). Washington suggests amending either the preference clause or statutorily defining the marketing area.

11. Would an interstate compact have value—either legal, political or moral in preventing the attaching of the preference clause to California power purchasers?

Answer. No—unanimous.

12. Would transmission of Bonneville power to the bay area possibly raise the question of economic transmission distance so that a preference-type buyer in northern California could assert a claim?

Answer. This question was not submitted to Washington and California, but Oregon's short answer is "Yes".

Sincerely yours,

JONEL C. HILL, *Commissioner.*

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STATE OF WASHINGTON

DEPARTMENT OF CONSERVATION AND DEVELOPMENT,
*Olympia, Wash., January 21, 1960.*

Dr. WILLIAM A. PEARL,
*Administrator, Bonneville Power Administration,*
*Portland, Oreg.*

DEAR DR. PEARL: The State of Washington appreciates your invitation to comment upon the preliminary draft of the "Study of a High Voltage Electrical Interconnection Between the Pacific Northwest and California," prepared by the Bonneville Power Administration in cooperation with the Bureau of Reclamation.

We recognize that the report was prepared under specific instructions and time limitations which precluded adequate analysis of all pertinent factors. Our comments, therefore, are not made to discredit the report and the valuable data it contains, but, instead, to point out the need for additional study.

Following are the comments of the State of Washington:

1. We are of the opinion that the report, because of its limited scope and basic assumptions, falls far short of determining the full benefits that might accrue from a high voltage intertie.

2. We feel that studies should be undertaken which would consider the following factors:

(*a*) Hydraulic coordination of the entire resources of both regions instead of Federal resources only.

(*b*) Value of peaking capacity taking into consideration daily and seasonal load diversities.

(*c*) Requirements of spinning reserves in California.

(*d*) Value of backup and reserves.

(*e*) Transmission of short-term firm power to California which is not usable in the Northwest.

(*f*) Probable value of steam displacement energy in California for the next 25 years.

(*g*) Use of a tieline for sale or exchange of non-Federal as well as Federal surplus power and energy.

3. In addition to the above factors, we believe further study should be devoted to the following:

(*a*) Conservation of natural resources.

(*b*) National defense and disaster aspects.

(*c*) Transmission costs and coordination in California.

(*d*) Legislative or other safeguards necessary to assure each area control over its power resources.

4. We recognize that the Bonneville Power Administration has neither the authority nor the staff to undertake the broad-scope studies outlined above.

5. The States of Oregon, Washington, and California, on the other hand, through the Pacific Coast Governors' Power Coordinating Committee, are able to undertake comprehensive studies to determine the full benefits. The committee will consider undertaking such studies at a meeting to be held on January 24.

In light of the need for additional study the State of Washington recommends that no surplus power of the Pacific Northwest be sold for use in California until (1) safeguards are obtained for all power consumers in the Northwest and (2) studies, if undertaken by the Pacific Coast States, are completed.

Sincerely yours,

EARL COE, *Director.*

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PACIFIC GAS & ELECTRIC CO.

SAN FRANCISCO, CALIF., *February 5, 1960.*

Dr. WILLIAM A. PEARL,
*Administrator, Bonneville Power Administration,*
*Portland, Oreg.*

DEAR DR. PEARL: The comments of the California investor-owned utilities on the preliminary draft of "Study of a High Voltage Interconnection Between the Pacific Northwest and California," as submitted to you on January 15 under the heading, "Major Items Requiring More Detailed Explanation or Revision", may be published along with the report. However, the separate comments

entitled "List of Corrections or Revisions" could be omitted where those corrections or suggested revisions have been made in the final draft.

In reading comments of others, it was noted that several in the Northwest recommended legislation limiting the Bonneville service area and provisions of the Bonneville Act to the Oregon-California border prior to sale of any power to California, even over a private tie. It is our understanding that sale of power to a private purchaser at the California border does not extend the BPA service area beyond its present limit provided, as contemplated under the proposed sale to P.G. & E., the power is not wheeled to a preference customer in California. Such sale would be similar to those presently made at other interconnections for use outside of BPA service area.

Some have commented that additional benefits could be realized by flow of power from northern California to firm up Northwest surplus energy. In studying the possibility of such benefits, it must be realized that although northern California may have surplus thermal energy in normal years, there is little or no surplus energy available for export in adverse water years. The little energy that might be available would be generated in the least efficient steam plants and transmitted, with attendant losses, from those plants to the Northwest and consequently would be very expensive.

Mention was made at the January 25 meeting of the subcommittee of new developments which may affect the power marketing picture in California and would require further study. It should be noted that the data on California loads and resources contained in the report were accumulated jointly by the Federal Power Commission, Bureau of Reclamation, State of California, and public agencies and private utilities in California. We are unaware of any new developments, and believe the BPA report to be complete with respect to loads and resources in California. However, if any new developments have arisen, the California utilities will be pleased to participate in further study.

It is requested that this letter also be made a part of our published comments.

Very truly yours,

WALTER DREYER.

Copies to:
Mr. John C. Boyle, California Oregon Power Co.
Mr. Harry A. Lott, Southern California Edison Co.
Mr. Fred Oldendorf, California Electric Power Co.
Mr. E. D. Sherwin, San Diego Gas & Electric Co.

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COMMENT OF CALIFORNIA PRIVATE UTILITIES ON PRELIMINARY DRAFT OF "STUDY OF A HIGH VOLTAGE INTERCONNECTION BETWEEN THE PACIFIC NORTHWEST AND CALIFORNIA," DATED DECEMBER 1959

Comment of the California private utilities on the preliminary draft of the "Study of a High Voltage Interconnection Between the Pacific Northwest and California" as offered herein is arranged in two parts; one part covers major items which require more detailed explanation or revision and the other essentially lists corrections or revisions required in the interest of accuracy or clarity.

### A. MAJOR ITEMS REQUIRING MORE DETAILED EXPLANATION OR REVISION

*Chapter I. Electric power and energy loads and resources*

Under "Pacific Northwest," at top of page 17 [1] reference is made to appendix charts III, IV, and V. At this point in the report attention should be directed to the showing on charts IV and V that on the average, even without Mica storage, there would be no power available for export in the months August to April after 1968, and none available in any month after 1978.

Under "Northern California" at end of the section on "Loads" on page 18, in order to make clear the relation between the several types of operating agencies, the following sentence should be inserted:

**Public agencies having their own generation rely on the Pacific Gas & Electric Co. system to firm their generation or purchases from the Central Valley project and all rely on the company system for reserve generating capacity.**

Under "Northern California"—"Resources" page 18, reference is made to appendix tables 14 through 19. A note on the tables reads, "See accompanying text for explanation and identification." This text is not included in the draft report. The explanatory notes submitted by the Regional Office of the Federal Power Commission, or a digest thereof, should accompany the tables.

*Chapter II. Coordination between the power system of the Bonneville Power Administration and the Central Valley project*

In this chapter, two bases of analysis are described. The first or realistic one assumes all existing obligations and contracts of both Bonneville Power Administration and the Central Valley project in effect. Under this assumption there are no benefits of coordination. The second or hypothetical one assumes (*a*) that high grade secondary energy would be withdrawn from Pacific Northwest customers and used for coordination, and (*b*) that Central Valley project would not be supported by the P.G. & E. system as is now provided for under a contract running to 1971. This method shows that coordination would increase dependable capacity of the Central Valley project by 176,000 kilowatts over what is presently provided by P.G. & E. support. However, the analysis does not clearly relate this increase in dependable capacity to the greater loss of high grade secondary power in the Northwest, nor does it show the cost of some 600,000 kilowatts of tieline transmission capacity required to effect the coordination.

It is recommended that this chapter also show development of the amount of increased firm power in the Northwest that could be obtained by coordination after providing the Central Valley project the same amount of dependable capacity as they now obtain with P. G. & E. support. This amount (200,000 kilowatts) is mentioned in the conclusions of this chapter without prior explanation.

*Chapter III. National defense aspects of a Pacific Northwest-California intertie*

There are several statements in this chapter which might imply that energy could be exported from northern California to the Northwest on a firm basis. The Northwest could not rely on such export

[1] The page numbers indicated in this report refer to page numbers in the document as submitted by the Department.

on a firm basis because as load and resource data show, in an adverse year there is no surplus energy over and above necessary reserves in the integrated hydro and thermal electric power system in northern California. The statements referred to should therefore be qualified to reflect this.

*Chapter IV. Transmission plans, costs, and economic feasibility*

The description of "Economic feasibility" should be clarified. It is recommended that this be done by amending the opening sentence under "Economic feasibility" on page 42 to read as follows:

Economic feasibility of the various plans of interconnection as used in this report depends upon the cost of transmission, the value of the energy at the load center, availability, and usability of this power, but does not consider the cost of Bonneville power delivered to the proposed interconnecting facilities or any allocation of cost for the use of existing transmission facilities of the utilities.

*Chapter VI. Rights of preference customers*

To more fully summarize the regional solicitor's opinion it is suggested that the last sentence be deleted and the following substituted:

His opinion, which follows, indicates that if the United States constructed an interconnection between the Federal power systems in the Pacific Northwest and California, (1) the Bonneville service area would then include that part of California where Bonneville power could be marketed; (2) the preference provisions of the Bonneville Act and other Federal statutes would apply throughout the enlarged area; (3) under these provisions the Bonneville Administrator could not withdraw power from a preference customer in California to serve a nonpreference customer in the Northwest; (4) the Administrator would not be required to withdraw power from a preference customer in California to serve a preference customer in the Northwest, and (5) the Administrator could withdraw power from a preference customer in the Northwest to serve a preference customer in California. Moreover, even with respect to withdrawals of power from nonpreference customers in California, the Solicitor concludes that "it is obvious that legislation would be required to modify the preference provision in order to assure that power sold to California applicants, both preference and nonpreference, could subsequently be withdrawn and disposed of in the Pacific Northwest if that power were required in that area."

*Chapter VIII. Financial feasibility*

The following statement should be added to the conclusions prior to the last sentence of the first paragraph on page 58:

However, a Federal line would not be financially feasible for the reason that surplus secondary energy delivered in the San Francisco Bay area is estimated to have a value of 3.1 mills per kilowatt-hour and Bonneville's charge of 2.1 mills for 95 percent load factor power at the California border is equivalent to 2.4 mills for each kilowatt-hour delivered to the bay area, leaving only 0.7 mill to cover the cost of the new transmission facilities. This amount would not cover the cost of transmission from the Oregon border to the bay area on Federal transmission lines. While it would cover the cost of a Federal 230 kilovolt circuit from the border to Pit 3, it would not cover the values supplied by regulation of the utility's Pit River plants and the use of existing transmission facilities between Pit 3 and the bay area.

SUMMARY AND CONCLUSIONS

This section (pp. 1–7) should be modified as follows to be consistent with the foregoing comments and findings in the report.

On page 2 reference is made to economic and financial feasibility. Since these terms are used throughout the report, a clear definition should be provided the reader at this point.

In describing California pumping loads on page 3, it should be noted that peak pumping demands do not occur in July after demands

of the California water plan have developed. Also, it should be noted that demands may be relatively high in months when there is no surplus energy in the Northwest as the reason California pumping demands could not rely on the Pacific Northwest for energy.

In describing results of the hypothetical analysis of coordination on page 4 the reference to 500,000 kilowatts increase over isolated operation should be replaced by giving the increase in Central Valley project of 176,000 kilowatts. Also give the increase in firm power in the Northwest with the Central Valley project remaining the same as with P.G. & E. support. These hypothetical gains should then be related to the loss in high availability secondary power and the transmission tieline capacity and costs required for such coordination.

The summary of the Regional Solicitor's opinion should state that, if the United States constructed an interconnection between the Federal power systems in the Pacific Northwest and California, Bonneville service area would be extended to include both areas. The Administrator could not withdraw power from a preference customer in California to supply a nonpreference customer in the Northwest and would not be required to withdraw from the preference customer in California to supply another preference customer in the Northwest.

Costs of three circuits are given under "Costs" and are described as economically feasible, while in the following paragraph the report states that only two circuits were found to be economically feasible. It should be noted that the $10,800,000 Federal Yamsay-Keswick line would be an uneconomic alternative to the shorter $5,800,000 tieline. Moreover, the Yamsay-Keswick alternative may compare even less favorably because it appears that the estimated capital cost would not provide adequate transmission capacity south of Keswick.

Under "Financial feasibility" it should be stated that no line is financially feasible without (1) reregulation of P.G. & E. Pit River plants, (2) use of existing P.G. & E. transmission facilities, and (3) ability to purchase the energy at a high load factor under the "C" rate. Therefore, no all-Federal line would be financially feasible, and only one 230-kilovolt private line would be financially feasible.

January 15, 1960.

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## INDUSTRIES SERVED BY BONNEVILLE POWER ADMINISTRATION

JANUARY 15, 1960.

DR. WILLIAM A. PEARL,
*Administrator, Bonneville Power Administration,*
*Portland, Oreg.*

DEAR DR. PEARL: We appreciated very much your action in transmitting to us promptly a copy of the Bonneville study on the California intertie. In accordance with your request we have examined this report as carefully as the limited time and availability of information permitted. We do not have at our disposal the means of checking into the background of the various tables or other data presented in the report. Our comments are, therefore, necessarily based on the assumption (which we are confident is correct) that the data were carefully assembled, and also analyzed and applied in a logical manner.

On this basis we agree fully with the conclusion that the only economically feasible interconnection with California would be a 230-

kilovolt line between Klamath Falls and Pit Power Plant No. 3 of the Pacific Gas & Electric Co. (designated as plan I) to be constructed by the interested utilities, since it is the only interconnection that shows a benefit/cost ratio substantially higner than unity, 4.13 on a 10-year basis and 4.14 on a 25-year basis.

The report states that the capacity of this interconnection can be increased from 160-megawatts to 200-megawatts by making some additions to the transmission facilities between pit No. 3 and the San Francisco Bay area as shown in plan II. These additions would also seem to be feasible because the benefit/cost ratios for the added increment of power are 2.79 and 3.02 for 10 and 25 years.

A second 230-kilovolt line, from Redmond to Butt Valley, added to plan II (which is plan V) seems to be definitely marginal, since the benefit/cost ratio on a 10-year basis is below unity and is only slightly above unity on a 25-year basis, apparently on Federal financing. On private financing, in whole or in part, the ratio on a 25-year basis would no doubt also be less than unity. The other plans are all either not feasible at all, or so much less desirable than plan II that they should be eliminated from consideration.

For the reasons stated above and accepting the background data as given, we concur in the economic conclusions reached by Bonneville and urge that the report be adopted by the Department of Interior as a basis for any interconnection which may be made between the Pacific Northwest and California.

In view of the legal opinion concerning the rights of preference customers, we wish to emphasize our strong feeling that, if an intertie is constructed, the sale of any energy for ultimate use outside the Pacific Northwest should be arranged in a manner which will protect fully the supply of power for the Pacific Northwest and will limit the sale of such energy to that which is truly surplus to the needs of the Pacific Northwest and which can be produced from water which would otherwise be spilled.

Respectfully submitted,

Aluminum Co. of America, Anaconda Aluminum Co., Carborundum Co., Crown Zellerbach Corp., Harvey Aluminum Co., Hanna Nickel Smelting Co., Kaiser Aluminum & Chemical Corp., Keokuk Electro Metals Co., Pacific Carbide Co., Pennsalt Chemical Corp., Pacific Northwest Alloys, Inc., Rayonier, Inc., Reynolds Metals Co., Union Carbide Metals, Victor Chemical Works. By L. H. Wolgast (by authorization of all the foregoing companies).

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## RURAL ELECTRICAL COOPERATIVES—WASCO PUD

WASCO ELECTRIC COOPERATIVE, INC.,
*The Dalles, Oreg., January 20, 1960.*

DR. WILLIAM A. PEARL,
*Bonneville Power Administration,*
*Portland, Oreg.*

DEAR DR. PEARL: In response to your request to rural electric cooperatives in Oregon, Washington, and Idaho for comments on the current draft of your report on high voltage transmission tie between

the Columbia River system and utilities in the State of California, I attach herewith a summary of the vote of 32 such cooperatives on policy questions which I submitted to them recently.

The results of the questionnaire as shown attached do not reflect in detail our utilities' viewpoints on your draft of report, since the questionnaire was prepared and answered prior to the issuance of your draft. They do, however, express firm opinions held by members of our group on major policy factors involved in the intertie proposal.

Our views on the draft of report, itself, will be sent to you in the next day or two through the medium of the Northwest Public Power Association.

Yours very truly,

ERIC A. JOHNSON, *Manager.*

CALIFORNIA INTERTIE

This is the summary of the report which I made to the Oregon Rural Electric Cooperative Association meeting at Eugene on December 3, 4, and 5, 1959:

This survey has been tabulated, showing that we received 15 replies from Oregon, 9 from Washington, 3 from Montana and 5 from Idaho—making a total of 32 replies out of a possible 37. I think it is a very good response and I have broken these into four categories by the questions which were asked on the questionnaire:

| | |
|---|---|
| 1. Build the intertie: | |
| Yes | 30 |
| No | None |
| Undecided | 2 |
| 2. Federal or public owned: | |
| Federal | 20 |
| Public | 10 |
| 3. Amend Bonneville Act: | |
| Yes | 11 |
| No | 2 |
| "No tie should be built without safeguarding Columbia River power, but we fear opening up Bonneville law for amendment" | 17 |
| 4. Quote official view of cooperative: | |
| Yes | 24 |
| No | 6 |
| Undecided | 2 |

In connection I might add it looks like the coops of the Pacific Northwest prefer an intertie, Federal owned or public ownership construction with some safeguards to the Bonneville Act by amendment; and I believe that our main reason for supporting this is to maintain our present Bonneville rate for many years to come, as this California intertie would assure additional revenue to the Bonneville Power Administration so that the day that we would have to increase our rates would be many years from now, rather than in the next 5-year period.

ERIC A. JOHNSON.

NORTHWEST PUBLIC POWER ASSOCIATION

VANCOUVER, WASH., *January 27, 1960.*

Dr. WILLIAM A. PEARL,
*Administrator, Bonneville Power Administration,*
*Portland, Oreg.*

DEAR DR. PEARL: We appreciate the opportunity to discuss the report prepared by BPA of "the feasibility and desirability of a high-voltage interconnection for disposal of surplus secondary energy between the Federal power systems in the Pacific Northwest and California." We request that this be filed as our letter of constructive comments on the intertie study, replacing our previous letter of preliminary comments.

The Northwest Public Power Association has long supported a study of this nature. We have taken an active interest in a California intertie since 1948. We will continue to support an adequate study. We believe there are great potential benefits in such an interconnection of maximum capacity between regional systems. To this end we have also urged studies of interconnections between not only California, but also the Missouri River Basin and Canada. NWPPA is on record as favoring enactment of Senate Resolution 71 which calls for such extensive studies.

This report, we feel, is not fully responsive to the Senate committee's directive. It does not discuss all potential values which might accrue to both regions. Parts of the study cannot be sufficiently analyzed because of a lack of substantiating details. It seems to us that the report deviates from the standard methods for determining economic feasibility for a proposed Federal project and substitutes the approach of merely determining financial feasibility as would be the approach for a private corporation. This tends to present a highly conservative minimum picture of benefits and values. Since the Congress asked for the study to cover an intertie between two Federal power systems, it follows that Congress must have intended the use of conventional Federal methods of computing economic feasibility.

Three primary points need to be made concerning the study. First and foremost, we feel the necessity for an amendment to the Bonneville Act. This amendment should establish and define the boundaries of the Bonneville service area with respect to the Oregon-California boundary and should limit the application of the act to this area. It should provide that the use of any intertie should be limited to power for which there is no market within the region at the time of export. No power should be sold outside the region without the right of first refusal at the same rate within the region. Rights of preference customers should be safeguarded. We do not, however, contemplate the necessity for changing the preference clause of the Bonneville Act.

Second, since detailed studies are now being made by the States of Oregon, Washington and California on tie-line facilities, it would seem most wise to hold in abeyance any action until the results of

these studies are known. We fully contemplate that results of the state investigations will be available before the next Congress convenes

Third, in order that this line and subsequent interconnections may be used to protect and serve the best public interest, we think it highly important that this line not be owned by any one company as a monopoly. It should be a common carrier facility. Such ownership may greatly affect the long-range economics. These long-range economics will certainly be greater than the partial and short-range economics covered in this report.

Since the report does not contain recommendations, we would urge specific recommendations be made to cover at least these three points.

We have a large stake in the business success of Northwest hydroelectric projects and the Bonneville Power Administration. A more extensive look should be taken at future market potentials and the need for an agressive promotion of power sales by BPA.

The report did not discuss certain factors which might have a bearing on the economic feasibility of a larger intertie. Such factors include: exchange of peaking power, exchange of power both north and south, use of the tieline as a "common carrier," exchanges of power to firm up supplies during seasonal power shortages, future possibilities in the area of national defense and eventuality of a high voltage Federal line as a part of a larger national grid network. Further study should be made in regard to the rate schedules at the border and the effect an increase in BPA rates might have on future sales.

In the light of these considerations, we would strongly urge that any action be deferred until the results of the State studies are known; and until an amendment to the Bonneville Act has provided the establishment of a California-Oregon boundary for the Bonneville service area, limiting operation of the Bonneville Act to such area. Enclosed is a copy of our July 30, 1959, draft of a possible amendment to the Bonneville Act. We appreciate that this may not be completely satisfactory. I hope it will be helpful to those who will work on the draft. It was based on the assumption of a Federal tieline.

We desire to assist BPA in every possible way to improve the revenue situation and to wipe out the present deficit. We hope these three primary comments will assist in achieving this goal and that, when the interconnections are made, they will best serve the public interest.

Sincerely,

GUS NORWOOD, *Executive Secretary.*

(First draft, July 30, 1959)

A BILL To amend the Bonneville Project Act to authorize construction of transmission facilities between the U.S. Columbia River Power System and the Central Valley project

*Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,* That subsection 2(b) of the Bonneville Project Act of 1937 is amended by adding thereto the following:

"The Administrator and the Commissioner of Reclamation are authorized to interconnect the U.S. Columbia River Power System and the Central Valley project by constructing transmission facilities for the sale or exchange of residual exportable electric power as the supplier determines in his sole judgment cannot be utilized or sold within its marketing area as divided at the California-Oregon boundary. Contracts, rates and charges for the sale, exchange, and wheeling of electric power over said facilities shall be approved by the Secretary of the Interior subject to review on December 19, 1964, and every five years thereafter. Before approving such contracts, rates and charges the Secretary shall give public notice and upon adequate request shall arrange for a public hearing in the area affected."

## PACIFIC NORTHWEST PUBLIC AGENCIES—WASHINGTON PUBLIC UTILITY DISTRICTS

The following comments are made on the preliminary draft of the "Study of a High Voltage Electrical Interconnection Between the Pacific Northwest and California," prepared by the Bonneville Power Administration in cooperation with the Bureau of Reclamation at the direction of Secretary of the Interior Fred A. Seaton by request of the Senate Committee on Interior and Insular Affairs. The comments are submitted on behalf of certain Pacific Northwest public agencies, who as Bonneville Power Administration utility customers have been represented through the invitation of Bonneville Power Administration on the study consultation committee.

The consultation committee served only in the capacity of reviewing methods and basic factors proposed by the Bonneville Power Administration to be included in the study and in no way is responsible for either the basic approach, degree, or extent of the study. Further, representation on the consultation group was on an informal basis and although the comments herein have been discussed fully with a representative group of public agency personnel, they should not be accepted as having been approved in whole or in part by any one particular utility. Invitation was extended to all utility interests to submit direct comments of their own if so desired.

Comments are as follows:

1. The opinion of the regional solicitor as to the effect and application of the preference clause on power purchases from the Bonneville Power Administration, either in the Pacific Northwest or California, indicates the need for some direct method, either by legislation or other means, to assure first rights to and full benefits from the Pacific Northwest hydropower resources to the power consumers in this area. This should be accomplished before any contracts are negotiated for sale of such power or any additional tielines, publicly or privately owned, are constructed.

Consideration should be given to amendment of the Bonneville Act to (*a*) establish the southern boundary of the Bonneville Power Administration service area at the California-Oregon boundary and to limit operation and application of the Bonneville Act to within said service area; and (*b*) to provide that any Federal hydropower usable in the Pacific Northwest may not be exported from such service area.

2. The study is not in sufficient detail to substantiate certain of the assumptions made or used and thus the conclusions which result cannot be fully analyzed and judged. The study, in our opinion, is not fully responsive to the Senate committee's resolution being limited in scope and analysis. Approach to the study, while carrying out the specific worded instructions of the Senate committee resolution, appears to have been made on a basis which does not determine all potential public benefit values which could be obtained through an interregional tieline. We feel it was the purpose of the Senate resolution to establish the fullest values of any possible tieline, more specifically a federally owned line, and particularly between the two Federal systems of the Central Valley project and the Bonneville Power Administration.

For example, by restricting the study to the transmission of Pacific Northwest secondary energy southward only, no value in the feasibility of the tieline is given to factors such as—

(*a*) California off-peak economy energy for import to the Northwest.

(*b*) Exchange of peaking power between regions, which will carry a greater value than secondary energy.

(*c*) Availability of California power to firm up Northwest supply during seasonal power shortages.

(*d*) Term sales of temporary surplus firm power of no sales value or use in the Pacific Northwest.

(*e*) Use of tieline as common carrier for sale or exchange of non-Federal surplus power and energy.

3. Sales to utilities outside of the established service area of the Bonneville Power Administration and involving non-Federal tielines inside the service area should be made at the terminal facilities of the Bonneville Power Administration nearest to the purchasing utility but inside the established Bonneville Power service area and without benefit of Bonneville paying wheeling costs to the border of its service area. Sales should be made at rates and under conditions no different from what the same class and amount of power would be sold to a Pacific Northwest customer.

## CONCLUSION

In view of—

(*a*) The restrictive nature of this study and its limited results;

(*b*) The need for legislation or other positive assurances to Pacific Northwest power consumers that any Federal hydropower usable in the Pacific Northwest may not be exported from this region;

(*c*) The desirability of full utilization of the Pacific Northwest hydro resources for the purpose of greatest financial return to such projects;

(*d*) The need for the fullest possible use of renewable hydro resources to effect savings in fossil fuel resources in the national interest;

(*e*) The announced intent of having a broader study made under the auspices of the State of California in possible conjunction with the States of Oregon and Washington, and which studies may also analyze possible non-Federal public ownership of tieline facilities;

(*f*) The desirability of establishing such a tieline as a common carrier for non-Federal power as well as Federal power; and

(*g*) The need for preventing monopolization of such a tieline by any single utility interest;

we recommend that in adopting this report or negotiating contracts to carry it out provisions first be made for:

(1) Legislation or other positive assurances that any Federal hydropower usable in the Pacific Northwest may not be exported from this region.

(2) Legislation establishing a specific southern service boundary for the Bonneville Power Administration with the limitation of the application of the Bonneville Act to the defined service area.

(3) Preventing monopolization of the tieline by any single utility interest.

(4) Permitting future enlargement of the tieline so that any greater values which may be established by a broader study by the States or others may be realized.

Under such conditions it would be proper to proceed with the sale of power now being wasted and thereby provide needed income to the Pacific Northwest Federal power system.

Respectfully submitted.

KEN BILLINGTON,
*Executive Secretary.*

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CHELAN COUNTY PUBLIC UTILITY DISTRICT

WENATCHEE, WASH., *January 14, 1960.*

Mr. KEN BILLINGTON,
*Seattle, Wash.*

Dear KEN: The Board of Commissioners of Chelan County Public Utility District have reviewed the preliminary report prepared by Bonneville on the high voltage transmission interconnection between the Pacific Northwest and California, and we are of the opinion that the report is inconclusive in some respects and does not fully answer the requests set forth in the Senate Interior Committee's resolution of May 11, 1959. We would be interested, therefore, in further study of the problem to determine more specifically what the benefits to the Northwest would be from this intertie. It is our firm conviction in light of the solicitors opinion included in the report in regard to rights of preference customers that we should not support sale of Columbia River power to California in any form under the present service area provisions of the Bonneville Act.

We are also of the opinion that the question of the California intertie should be considered in conjunction with other interregional transmission interties such as a tie with the Missouri River projects. Such a comprehensive study would give the people of the Northwest some basis for determination of the type of interregional interconnection that would be of greatest benefit to our region. In this connection it is our understanding that there is a Senate resolution being considered that would authorize studies on interregional transmission interties. This resolution should be given our wholehearted support and final decision on the California intertie withheld until such a comprehensive report is available.

Very truly yours,

L. J. RICHARDSON,
*President, Board of Commissioners.*

GRANT COUNTY PUBLIC UTILITY DISTRICT

EPHRATA, WASH., *January 8, 1960.*

Mr. KEN BILLINGTON,
*Executive Secretary, Washington Public Utility District Association, Seattle, Wash.*

DEAR MR. BILLINGTON: The Public Utility District of Grant County has a great interest in the BPA "Study of a High Voltage Interconnection Between the Pacific Northwest and California."

Priest Rapids Dam, the first half of the district's Columbia River development, has recently started generating power. Wanapum generation will follow in 4 years. Present and future power sales from these plants are related to the disposition of all other power generated in the Pacific Northwest.

The present serious river coordination problems in the Columbia River watershed must be resolved before any commitments can be made to transmit power out of the area. We recommend that this be accomplished and the BPA service area be further defined with respect to application of the preference clause before any action is taken based on this report.

We hope that this BPA report will be viewed as only a step toward a much needed and more extensive study of high voltage interconnections.

Very truly yours,

E. B. GIBBONS, *Manager.*

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CITY OF McMINNVILLE, OREG.

WATER AND LIGHT DEPARTMENT,
*McMinnville, Oreg., January 13, 1960.*

Subject: Preliminary draft of study of a high-voltage electrical interconnection between the Pacific Northwest and California.

Dr WILLIAM PEARL,
*Administrator, Bonneville Power Administration, Portland, Oreg.*

DEAR SIR: During the past week we have attended two meetings pertaining to the preliminary draft of the interconnection between the Pacific Northwest and California. At these two meetings the following comments on the draft were made:

1. In the study no mention was made of any possibility of California power flowing north over this line. It was felt by some of those present that there might be some tangible benefit to the feasibility of the line, if this were done.

2. It was felt that the value assigned to the power was made on a noncompetitive basis. Again possibility the feasibility of the line might be enhanced, should a competitive situation actually exist.

3. Some of those at the meetings felt that consideration should be given to the proposed line as a common carrier. The thinking on this was that some of the non-Federal agencies might then wheel power from their projects south to California on a withdrawable basis, and the Northwest utilities could then meet their load requirements from Bonneville.

From this study many of us feel that there is definitely a need to amend the Bonneville Act in order to preserve the preference rights for the Northwest public agencies. It was felt that this could be done through a defined service area provision.

We would like to thank you and your staff for making this preliminary draft available to us.

Sincerely yours,

ALAN H. JONES, *General Manager.*

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CITY OF SEATTLE, WASH.

DEPARTMENT OF LIGHTING,
*Seattle, Wash., January 15, 1960.*

DR. WILLIAM A. PEARL,
*Administrator, Bonneville Power Administration,*
*Portland, Oreg.*

DEAR DR. PEARL: Your letter of December 23, 1959, transmitting the preliminary draft of the Administration's report on the high voltage interconnection between the Pacific Northwest and California, invited comments from the various groups of the subcommittee of the consultation committee. It also invited individual members' comments, and we wish to take this opportunity to comment on the report.

First, we want to assure you that the following comments are offered on a purely constructive basis. It is realized that the report was prepared under certain specific instructions, and some of our comments may go beyond these instructions. If they do, it is only in an attempt to offer suggestions as to an overall study of the various factors which may become involved in the question of the California tieline.

1. It is our feeling that an important item that is not covered in the report is the diversity in the peakload period of the two areas involved, and the possibility of utilizing energy capacity that may be available in the California area in the wintertime to increase the firm capability of the Northwest area's resources during critical water conditions. It is our belief that substantial gains might be possible in this field.

2. With respect to the amendment of the Bonneville Act, especially the preference provisions thereof, which is mentioned in the regional solicitor's letter of November 4, 1959, it is suggested that consideration be given to the idea of amending the act to set forth a specific service area of the Bonneville Power Administration beyond which the preference provisions would not apply.

With respect to the possibility of securing firming capability from California, under item 1, it is realized that it would be necessary to give the Bonneville Power Administration legal authority to buy non-Federal blocks of power which probably would require an amendment of the act. With respect to this idea, we believe that the report has been limited because of Bonneville's legal inability to buy firm capacity during a critical water year from any source.

3. Assuming that the Bonneville Act was amended to define the limits of its service area geographically, then it is felt that Bonneville's present rates should only apply to that area, and that rates

for export from the area might be different from those now in existence.

4. It appears that in the Senate subcommittee resolution it is recommended that the study be made together with conclusions and recommendations. Certain conclusions are set forth in the report, but it is not clear what the recommendations might be in this matter.

5. It is believed that a more thorough analysis of the potential market in the Bonneville Power Administration service area be conducted looking toward the adoption of a stronger marketing program which might result in further use of power in the area, particularly in the industrial field. This possibility might affect the economics of the tieline one way or the other, but it is felt that it should be made a part of the study.

6. Although the instructions are specifically directed to the study of a tieline between the Northwest and California, it is felt that interconnections with other areas might be more or equally feasible.

7. With respect to item 1 above, it is felt that possibly the effect of this interconnection upon the conservation of natural fuels has not been fully explored.

8. It is our interpretation of the statement in the report regarding national defense that the determination of the advantages are solely related to the size and capacity of the interconnection. It is felt that the firming up of Northwest power by excess thermal energy from California, and the mutual standby facilities for both areas which would be provided, would warrant a substantial increase in the capacity of the intertie. It is felt that possibly not enough emphasis, or sufficient analysis, has been made in the field of national defense.

The foregoing comments are offered for your consideration with the hope that they will be of assistance in the analysis of the preliminary draft of the report.

Sincerely yours,

PAUL J. RAVER,
*Superintendent of Lighting.*

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EUGENE WATER & ELECTRIC BOARD

EUGENE, OREG., *January 14, 1960.*

Dr. WM. A. PEARL,
*Administrator, Bonneville Power Administration,*
*Portland, Oreg.*

DEAR DR. PEARL: We would like to comment on your recent draft of a report to the Senate Committee on Interior and Insular Affairs relative to a Pacific Northwest-California intertie.

Analysis of the loads and resources portions of the report leaves some doubt as to whether sufficient recognition has been given to the potential market for secondary power in the Northwest. It is suggested that careful consideration should be given to the effect of a reduction in the rate to be charged for low availability of secondary power for both industrial and utility use in the operation of Northwest generating facilities. There might be some merit in giving utilities and industry in the Northwest an opportunity to purchase blocks of now unsalable secondary power at rates that would reflect the advantage

of utilizing existing transmission facilities within the region. When consideration is given to the cost of delivery of power to the California-Oregon line (wheeling plus losses) there might be a change in economic factors that would encourage local or regional markets.

Careful consideration should be given to the results of extending a preference and priority to Bonneville Power Administration power, both firm and secondary, to new areas or regions where power costs are now based on a large percentage of thermal power production. Any temporary revenue benefit to the Northwest system would be meager in comparison to the long-range effect on power costs in this region. It is very difficult to foresee the events or circumstances whereby a California or for that matter any nonregional preference customer would voluntarily or graciously withdraw in favor of a Northwest consumer, particularly if it were an industry or nonpreference utility.

It is recognized that the preceding comments on the preference aspect is largely a matter of policy. The report of the regional solicitor clearly outlines the result—preference cannot be waived—specific legislation would appear necessary if there were to be a limit to existing preference rights of the Northwest region.

The Eugene Water & Electric Board has asked that you be advised that they are in opposition to any federally constructed intertie transmission line with California utilities that would in any manner create a preference or priority to Northwest power supply. It is felt that the reported temporary monetary benefit to the Northwest is insignificant when compared to the risk involved in this respect. Present and foreseeable hydroelectric power supply should be reserved for use of Northwest utilities and industry, especially in view of the limited hydro power available. The board favors the sale of available secondary power to Northwest utilities at existing points of interconnection such as is presently the practice at Blaine, Wash., Anaconda, Mont., and La Grande, Oreg.

Thank you for the opportunity to comment on your report regarding the proposed California intertie.

Very truly yours,

BYRON PRICE,
*Superintendent-Secretary.*

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PACIFIC POWER & LIGHT CO.

PORTLAND, OREG., *February 1, 1960.*

Dr. WM. A. PEARL,
*Administrator, Bonneville Power Administration,*
*Portland, Oreg.*

DEAR DR. PEARL: In accordance with your letter dated December 23, 1959, we have reviewed the preliminary draft of the report on a transmission interconnection between the Pacific Northwest and California.

We concur with your findings that the supply of secondary surplus to present needs is of a relatively temporary nature and will be needed in due course to supply the energy requirements of the Pacific Northwest. We also concur in your proposal to dispose of this surplus on a temporary basis to Pacific Gas & Electric as fuel replacement. Such

a procedure, we believe, affords an opportunity to utilize temporary secondary surplus while fully reserving to the Northwest its native energy resources.

Sincerely yours,

E. ROBERT DE LUCCIA,
*Vice President and Chief Engineer.*

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PORTLAND GENERAL ELECTRIC CO.

PORTLAND, OREG., *February 5, 1960.*

Dr. WM. A. PEARL,
*Administrator, Bonneville Power Administration,*
*Portland, Oreg.*

DEAR DR. PEARL: Portland General Electric Co. has the following comments with respect to the preliminary draft of the report on the high voltage electrical interconnection between the Pacific Northwest and California.

We concur with the findings in the report that the current supply of surplus secondary energy is temporary and eventually will be needed to supply the energy requirements of the Pacific Northwest. In making the determination of the amount of surplus hydroenergy, should not consideration be given to existing exports to Idaho, Utah, eastern Montana, and Wyoming before determining the amount available for transfer to California?

Any contract for the sale of surplus energy should contain the necessary safeguards to insure that energy needed in the Northwest will not be exported. As a further safeguard in this respect, the construction of any facilities necessary to make the interconnection should be done by non-Federal interests. We specifically endorse the construction by the California Oregon Power Co. and Pacific Gas & Electric Co. of the proposed 230-kilovolt line between Klamath Falls and Pit River plant No. 3 in accordance with the conclusion in the report as to financial feasibility.

Sincerely yours,

FRANK M. WARREN, Jr., *President.*

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PUGET SOUND POWER & LIGHT CO.

SEATTLE, WASH., *February 5, 1960.*

Dr. WILLIAM A. PEARL,
*Administrator, Bonneville Power Administration,*
*Portland, Oreg.*

DEAR DR. PEARL: We have not had sufficient opportunity to review in detail the Administration's preliminary report on the high voltage interconnection between the Pacific Northwest and California. However, in general we believe that the Administration has taken a realistic approach to this problem, and we concur that the only power that should be made available for transfer to California would be secondary, which is surplus to the needs of the Pacific Northwest at any given time.

It should be pointed out that the potential needs of secondary energy in the Pacific Northwest will increase as time goes on. This

results from the fact that there is presently under active consideration large hydro developments in Canada which it would seem could profitably utilize secondary energy from this area and in return supply increased amounts of firm power to this region. Likewise, there is also under consideration by both public and private agencies the future construction of thermal plants. Secondary energy might be profitably used in connection with such a program.

If any secondary sales are made in the State of California adequate safeguards must be included to insure for the Pacific Northwest such secondary energy which might be of beneficial use to this region.

If the foregoing suggestions are properly recognized it would seem that they will best be implemented through the construction and ownership of a transmission line as recommended in your report.

Sincerely,

L. E. KARRER,
*Executive Vice President.*

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THE WASHINGTON WATER POWER CO.

SPOKANE, WASH., *February 5, 1960.*

Dr. WILLIAM A. PEARL,
*Administrator, Bonneville Power Administration,*
*Portland, Oreg.*

DEAR DR. PEARL: The Washington Water Power Co. appreciates the opportunity to comment on your study of the Northwest-California transmission interconnection. We are particularly mindful of the large amount of work done in a relatively short time on such a complicated and important subject.

Your conclusions have our support in that secondary energy will be available for export to California for only a few years, and that only a modest transmission investment can thus be supported.

We would like to suggest that this basic condition could be further substantiated by definitely including Canadian storage in the planning of the Northwest power supply. These storages, such as Kootenay, Arrow, Mica, Peace, will be of major consequence and will require very large amounts of secondary energy for coordination with the Northwest power system. This fundamental use of our secondary for the creation of firm power in the United States should certainly be placed ahead of export to California and warrants more complete consideration and protection than contained in the study.

It also appears that more definite consideration could be given to the potential use of interruptible energy in this area. Thermal generation will be required in rapidly increasing amounts in the not too distant future to supply the Northwest power needs. This use, among others, should be definitely included in your study.

We agree with your conclusions that an interconnection with California is of little value in increasing useful dependable capacity in the Northwest and therefore the interconnection must be supported by secondary energy transactions. Even though California thermal generation were to be included in your coordination study, the dependence of the Northwest upon it would be strongly questioned in view of its high cost and its effect in delaying desirable multipurpose hydro construction beneficial to the Northwest area.

Of utmost importance is the safeguarding of all Northwest energy for any possible future use in this area. We believe that your recommendations for the construction of the interconnection and for the sale of energy short of the California border will best serve this purpose.

Sincerely yours,

M. L. BLAIR,
*Vice President, Power Supply.*

## LETTER FROM SENATOR MURRAY TO SENATOR JACKSON ANNOUNCING HEARINGS ON INTERTIE

U.S. SENATE,
COMMITTEE ON INTERIOR AND INSULAR AFFAIRS,
*Washington, D.C., April 18, 1960.*

Hon. HENRY M. JACKSON,
*Senate Office Building,*
*Washington, D.C.*

DEAR SENATOR JACKSON: In response to your letter of April 14, concerning the proposal of the Pacific Gas & Electric Co. to purchase power from the Bonneville Power Administration, I advise that a hearing has been set for Thursday, May 5, for consideration of the proposal.

The Governor of California, who has advised that a consulting firm has been retained to study the intertie proposal, has been notified of this hearing on May 5. The Department of the Interior also is being advised of the hearing.

Should you desire to have any other interests in the Pacific North west notified of the hearing, please let me know.

Sincerely,

JAMES E. MURRAY, *Chairman.*

## LETTER REQUESTING COMMENTS OF THE FEDERAL POWER COMMISSION

U.S. SENATE,
COMMITTEE ON INTERIOR AND INSULAR AFFAIRS,
*Washington, D.C., March 11, 1960.*

Hon. JEROME K. KUYKENDALL,
*Chairman, Federal Power Commission,*
*Washington, D.C.*

DEAR MR. KUYKENDALL: Attached are two copies of a study of a high voltage interconnection between the Pacific Northwest and California, which was prepared by the Bonneville Power Administration in response to a resolution adopted on May 19, 1959, by the Senate Committee on Interior and Insular Affairs.

In view of the familiarity of the Federal Power Commission with the background of the intertie and its knowledge of the situation, the committee will appreciate your comments on the presentation from an objective standpoint.

Would it be practicable to have your comments by April 1, 1960?

May I advise that the committee is concerned with the current and prospective situation from a financial and service standpoint? This also includes protection of the Federal Government's investment in public power developments in the Pacific Northwest, as well as California and the related circumstances, such as adequate power service to the areas involved in the Pacific Northwest, as well as California.

Sincerely,

JAMES E. MURRAY, *Chairman.*

## RESPONSE OF THE FEDERAL POWER COMMISSION

FEDERAL POWER COMMISSION,
*Washington, April 6, 1960.*

Hon. JAMES E. MURRAY,
*Chairman, Committee on Interior and Insular Affairs,*
*U.S. Senate, Washington, D.C.*

DEAR MR. CHAIRMAN: This is in further reply to your letter of March 11, 1960, inviting the Federal Power Commission's comments on a study of a high-voltage interconnection between the Pacific Northwest and California which was made by the Bonneville Power Administration in response to a resolution adopted by your committee on May 19, 1959.

The study by the Bonneville Power Administration involves two basic analyses of the potentialities and feasibility of a high-voltage

interconnection between California and the Pacific Northwest. The first analysis concerns the possibilities of coordinating the two Federal systems in these areas, and is based on a comparison of the combined prime power capability of these systems, assuming isolated operations on the one hand and coordination of the secondary hydro resources of these systems on the other. Assuming that such coordination would be limited to the exchange of secondary hydro which is surplus to the firm and nonfirm loads in each area, it was concluded that no firm power benefits would be realized. Based on the coordination of all available secondary hydro resources of the two systems, it was found that a gain of about 500,000 kilowatts would be realized in the combined prime power capability of these systems. However, most of the additional prime power resulting from such coordination would be needed to firm the Central Valley project output, thus leaving only 113,000 kilowatts available for allocation to the Pacific Northwest.

The Bonneville Administration points out that coordination on the latter basis may be impractical for several reasons; namely, (1) most of the additional prime power provided thereby would have to be allocated to the Central Valley project, (2) the amount of additional firm power available for the Northwest would be small compared to the loads that would otherwise be supplied by secondary hydro resources in that area, (3) coordination of these systems would result in encroachment on the availability of secondary hydro power for interruptible industrial power loads and steam-electric energy replacement on electric utility systems in the Northwest, and (4) the gain in prime power capability of the combined systems may be expected to decline as additional hydro resources are developed in the Northwest.

In commenting on this phase of the Bonneville study the Commission wishes to point out that the secondary hydroresources of the Federal Columbia River system constitute a very valuable asset, not only to the Northwest region but to the Federal Government as well. The Bonneville study does not present any data on the financial value of this resource, but it appears that the revenue now provided by the sale of interruptible and secondary power in the Northwest is comparable to the monetary return that might be expected from the sale of additional firm power that could be made available to the Northwest by coordinating the two Federal systems. With respect to the California area, the coordination of these systems would not provide a significant financial and operating advantage beyond the benefits realized under present operating arrangements.

The second phase of the study is directed to determining whether a high-voltage interconnection between the Pacific Northwest and California would be justified, based upon savings in production costs that could be realized by utilizing surplus hydroelectric energy from the Pacific Northwest to replace fuel-electric generation in the San Francisco Bay area. The Bonneville Power Administration indicates that such an interconnection would be economically feasible, and would provide an important source of revenue to support its operations.

The report presents a number of alternative plans for effecting an interconnection between the two areas. Based on a comparison of the incremental costs and benefits attributed to each of these plans, the report shows that either one or two 230-kilovolt lines between these areas would be economically feasible. The report also indicates that

the interconnection would provide a number of incidental benefits, including mutual operational support during emergencies, the conservation of fuel resources, and increased reliability of service to industries of importance to the national defense.

The staff of the Federal Power Commission has made two exploratory studies of the possibilities of a high-voltage interconnection between the Pacific Northwest and California. These studies were made pursuant to section 202(a) of the Federal Power Act, which directs the Commission to promote and encourage the establishment of interconnections for the purpose of assuring an abundant supply of electric energy throughout the Nation with the greatest possible economy, and with due regard to the proper utilization and conservation of natural resources. The first of these studies, made in 1950, indicated that a single 230-kilovolt line between the two areas would be economically feasible based on the transmission of surplus hydropower from the Pacific Northwest to California for replacement of fuel-electric generation.

The second study was carried out in 1953 in response to a recommendation by the Defense Electric Power Administration that the Commission undertake a comprehensive study of this matter, with emphasis on the possibility of utilizing the interconnection to transmit power from California to the Pacific Northwest for the purpose of relieving recurring seasonal power shortages in the latter area. As a result of the second study, our staff concluded that an interconnection between these areas, consisting of two 230-kilovolt lines, would be economically feasible, based on (1) the utilization in California, of surplus Columbia River hydroelectric energy available during high streamflow periods when such energy could not be absorbed in the Northwest, and (2) the firming of secondary hydroelectric energy in the Northwest by energy that would be available at times from steam-electric plants in California.

In concluding its comments on this subject, the Commission wishes to point out that the results of staff studies, as well as the findings of the Bonneville Power Administration, indicates that a high-voltage interconnection between the Pacific Northwest and California would be desirable and economically feasible regardless of whether the regional facilities are constructed and financed by the Federal Government or by private interests.

Your courtesy in inviting the comments of the Federal Power Commission on the Bonneville Power Administration's study is greatly appreciated.

Sincerely yours,

JEROME K. KUYKENDALL, *Chairman.*

## LETTER REQUESTING COMMENTS OF THE COMPTROLLER GENERAL

U.S. SENATE,
COMMITTEE ON INTERIOR AND INSULAR AFFAIRS,
*Washington, D.C., March 11, 1960.*

Hon. JOSEPH CAMPBELL,
*Comptroller General of the United States,*
*General Accounting Office, Washington, D.C.*

DEAR MR. CAMPBELL: Attached are copies of a study of a high voltage interconnection between the Pacific Northwest and California which was prepared by the Bonneville Power Administration in response to a resolution adopted on May 19, 1959, by the Senate Committee on Interior and Insular Affairs.

In view of the familiarity of the General Accounting Office with the background of the intertie and its knowledge of the situation, the committee will appreciate your comments on the presentation from an objective standpoint.

Would it be practicable to have your comments by April 1, 1960?

May I advise that the committee is concerned with the current and prospective situation from a financial and service standpoint? These points also include protection of the Federal Government's investment in public power developments in the Pacific Northwest, as well as California and the related circumstances, such as adequate power service to the areas involved in the Pacific Northwest, as well as California.

Sincerely,

JAMES E. MURRAY, *Chairman.*

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### RESPONSE OF THE COMPTROLLER GENERAL

COMPTROLLER GENERAL OF THE UNITED STATES,
*Washington, April 12, 1960.*

Hon. JAMES E. MURRAY,
*Chairman, Committee on Interior and Insular Affairs,*
*U.S. Senate.*

DEAR MR. CHAIRMAN: Your letter dated March 11, 1960, requests our comments on a study of a high-voltage interconnection between the Pacific Northwest and the State of California which was prepared by the Bonneville Power Administration in response to a resolution adopted on May 19, 1959, by the Senate Committee on Interior and Insular Affairs. Your letter states that the committee is concerned with the current and prospective situation from a financial and service standpoint.

Our comments are confined principally to the financial aspects of the intertie primarily because the General Accounting Office staff does not include personnel with the specialized engineering knowledge that

would be required to fully evaluate related technical power capabilities, utilization, and other similar aspects of the study. Because of its technical nature and considering the need for an early response, we have not attempted to fully evaluate the reasonableness of the numerous assumptions made in the study. For example, we noted that the conclusions drawn in the BPA study rely on estimates of load growth and projects to meet load growths estimated by the Corps of Engineers in a June 1958 report entitled "Water Resource Development of the Columbia River Basin." This report would have to be carefully analyzed as to the criteria used by the corps to predict load growth and to assume the projects used to meet load growth, since availability of BPA power for transport to California is dependent on the load growth in the Pacific Northwest. The availability of surplus power, in turn, affects the economic and financial feasibility of any proposed BPA-California intertie. A full evaluation of those aspects of the BPA study which we are equipped to make would require a longer study by the General Accounting Office and could not be completed during this fiscal year.

The comments which follow are based on information obtained in connection with our annual audits and other special studies of Federal power activities in the Columbia River Basin, commonly referred to as the Columbia River power system (CRPS). This system consists of the Bonneville Power Administration and the multiple-purpose projects of the Corps of Engineers and the Bureau of Reclamation for which the Bonneville Power Administration is the power marketing agency. We are enclosing copies of our short form report on the audit of the financial statements of the Columbia River power system and related activities for fiscal year 1959.

*Current and prospective financial situation*

Power rates of the Bonneville Power Administration are designed to produce, over a number of years consistent with the requirements of law, sufficient revenues to meet the composite repayment requirements of the projects which comprise the Columbia River power system. These repayment requirements consist of the following principal items:

1. Operation and maintenance expenses allocated to the generation and marketing of power (excluding depreciation expenses).
2. Construction costs of facilities allocated to commercial power.
3. Interest on the Government's unrepaid investment in commercial power.
4. For certain projects, the investment in irrigation activities assigned for repayment from power revenues.

Repayment requirements for the projects of the Columbia River power system are for the most part based upon administrative determinations made pursuant to law rather than precise legislative requirements. For example, repayment periods and interest rates generally are not specified in legislation and the repayment requirements for these items are based upon administrative determinations.

Until recent years annual power revenues were more than sufficient to meet annual scheduled repayment requirements for the system as a whole. At June 30, 1957, the excess of funds returned to the

Treasury over scheduled repayments totaled $78,807,000. However, in fiscal years 1958 and 1959 commercial power revenues of the Columbia River power system were insufficient to meet annual scheduled repayments. The repayment deficiency for fiscal year 1959 amounted to $9,740,000 and at June 30, 1959, funds returned to the Treasury in excess of scheduled repayment had been reduced to $64,649,000. BPA estimates indicate that commercial power revenues during the 5 fiscal years 1960–64 will be about $32,519,000 less than scheduled repayments for that period. On this basis the amounts paid into the Treasury in excess of scheduled repayments will be about $32,130,000 at June 30, 1964.

A major factor for the decline in the repayment position of CRPS is that BPA's commercial power rate has not been changed since it was adopted in 1938, whereas projects placed in service during recent years have been built at higher construction costs than the initial projects in the system. This repayment requirements as revised to include recent projects have increased proportionately more than the revenues derived from the additional generating capacity.

BPA's rate schedules are effective for 5-year periods and require approval by the Federal Power Commission under provisions of the Bonneville Project Act (16 U.S.C. 832d). The current rate schedule expires on December 20, 1964. At the expiration of the last 5-year period, effective December 20, 1959, the Assistant Secretary of the Interior requested and was granted approval by FPC to continue existing rates through December 20, 1964. In requesting extension of the existing rates the Assistant Secretary emphasized that the applicable statutes do not fix a power payout period and do not require return of a fixed schedule of annual amounts. The Department pointed out that many basic underlying factors which affect rates have not yet been fully resolved. These factors include cost allocations, the interest rate, financial assistance to irrigation from power revenues and the design or structure of wholesale power rates. Considering these factors and in light of the forecast that the Columbia River power system would still be ahead of scheduled repayment at June 30, 1964, the Department concluded that BPA's rates should not be increased at that time. On December 16, 1959, FPC approved the Department's request to continue the existing rates.

BPA has in the past lost substantial potential power revenues because large quantities of secondary energy could have been but were not produced because such energy could not be sold in BPA's existing markets. BPA estimates that this situation will exist for at least 10 years more. One way of utilizing and selling this surplus secondary energy outside of BPA's power marketing area is by means of regional interties. Such interconnections already exist with British Columbia Electric Co. to the north and Montana Power Co. and Idaho Power Co. to the east. We understand that studies were made for a proposed BPA-Oregon to California intertie to the south in 1950 and 1953 but that there are no existing transmission facilities which are available and capable of carrying the surplus amounts of secondary energy from BPA to California. In view of the increasingly unfavorable future repayment outlook and the prospect of a compulsory increase in its rate structure, BPA, in late 1958 again explored the possibility of obtaining additional revenues through the sale of the secondary energy which was excess to the needs of the Pacific North-

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west by means of an interconnection with power facilities in California. The economic, financial, and other aspects of a proposed BPA-California intertie were discussed in considerable detail during hearings held on April 8 and 9, 1959, before the Subcommittee on Irrigation and Reclamation of the Senate Committee on Interior and Insular Affairs. At that time representatives of the General Accounting Office presented testimony regarding the financial and related matters of the Columbia River power system and submitted other data in connection with the proposed BPA-California intertie.

Under the assumptions in the February 1960 study, BPA concluded that one of the several plans considered appears to be desirable and financially feasible. This plan provides for the interconnection of the facilities of the California Oregon Power Co. (Copco) at Klamath Falls, Oreg., with the facilities of the Pacific Gas & Electric Co. (P.G. & E.) at Pit No. 3, California, by means of a 230-kilovolt circuit with a capacity of 200,000 kilowatts. The study indicates that under existing rate schedules at a sales price of 2.1 mills per kilowatt-hour, gross revenues from excess secondary energy sold for delivery to California during the next 10 years would average $1,800,000 a year. Under this plan BPA would be required to use existing Copco facilities to transmit its energy from BPA's present terminal at Yamsay, Oreg., to the beginning of the proposed intertie at Klamath Falls, Oreg. The study does not indicate whether Copco's charges, if any, for the use of these facilities were considered in determining the financial feasibility of the proposed intertie.

The study does not show the estimated financial effect of the various plans considered on the repayment capacity of the Columbia River power system. During the April 1959 hearings there was considered a proposed intertie having the same physical characteristics as the plan found financially feasible by BPA's February 1960 study. As stated in our letter, to the Subcommittee on Irrigation and Reclamation of your committee, dated April 9, 1959, (B–114858, printed in the hearings on page 109), under this proposal P.G. & E. would construct 70 miles of transmission line from its existing facilities to the Oregon border and Copco would construct 20 miles of transmission line from Klamath Falls, Oreg., to the California-Oregon border where the two lines would interconnect. Based on the then current negotiations BPA would absorb the line losses and wheeling charges (1 mill per kilowatt-hour) to the California border which would be considered the point of delivery to P.G. & E. At that point BPA would receive about 2½ mills for the energy. On this basis together with a condition of wheeling by Copco that the company reserve priority as to the disposition of its own surplus power, the net revenues to BPA would amount to about $900,000 a year. This net revenue would be available to meet repayment requirements of the Columbia River power system. In the event these negotiations eventually are the basis of contractual agreements, the additional revenues accruing to BPA would operate to lessen the amount of a future rate increase that may otherwise be necessary to meet the existing repayment requirements of Columbia River power system.

*Effect of intertie on service to power customers*

BPA estimates show that for several years there will be available from the CRPS substantial amounts of secondary energy which is

surplus to the needs for servicing customers in the Pacific Northwest. Information submitted at the April 1959 hearings, indicated that the importation of secondary energy over the proposed BPA-California intertie would not interfere with planned service to customers of Federal projects in California. On November 4, 1959, the Portland regional solicitor, Department of the Interior, rendered an opinion which interpreted the rights of preference customers under the provisions of the Bonneville Project Act, the Flood Control Act of 1944 (16 U.S.C. 825s), and the Reclamation Project Act of 1939 (43 U.S.C. 485h), governing the sale of power produced by Federal projects in the Pacific Northwest. The regional solicitor's opinion, in effect, states that:

1. The only statutory geographical limit of BPA's marketing area is the practical one of economic transmission distance.

2. Once the marketing area for CRPS power is extended to California, it cannot be contracted solely because the power is needed in the Pacific Northwest.

3. The preference customer statutory mandate applies in the entire marketing area regardless of geographic location.

4. There is no statutory priority as between preference customers or as between nonpreference customers regardless of geographical location.

5. Legislation would be required to assure that power sold to California applicants, both preference and nonpreference, would subsequently be withdrawn and disposed of in the Pacific Northwest if that power were required in that area.

We agree with the above conclusions reached by the regional solicitor. In the event a BPA–California intertie is accomplished as a Federal project and the Congress desires to give the Pacific Northwest a priority on CRPS power, it is believed that legislation would be necessary to exclude California customers from the preference clause provisions applicable to consumers of CRPS power and to otherwise reserve to the Pacific Northwest all electric energy generated by the Columbia River power system.

We trust the above information will serve the purpose of your inquiry. We will be pleased to discuss our comments with you or the members of your staff, if you so desire.

Sincerely yours,

JOSEPH CAMPBELL,
*Comptroller General of the United States.*

## COMMENTS OF SENATOR ENGLE

U.S. SENATE,
COMMITTEE ON INTERSTATE AND FOREIGN COMMERCE,
*March 22, 1960.*

Hon. JAMES E. MURRAY,
*Chairman, Senate Interior and Insular Affairs Committee,*
*U.S. Senate, Washington, D.C.*

DEAR MR. CHAIRMAN: I appreciate your courtesy in providing me with a copy of the latest report by the Secretary of the Interior on the Bonneville Power Administration's "Study of a High Voltage Electrical Interconnection Between the Pacific Northwest and California."

Your memorandum of February 18 says that comments are welcome. I am able to find very little difference in the February 1960 report from the December 1959 preliminary draft which was the subject of my letter to you of January 25, 1960. The reference in the preliminary draft to irrigation pumping requirements in California has been eliminated. And the map of principal transmission circuits apparently has been corrected. But the substance is the same.

So, except for the irrigation pumping reference, the observations in my January 25 letter still are valid, and the questions that I raised in the letter still are unanswered.

With respect to the solicitor's opinion on the rights of preference customers, I would gladly support legislation necessary to protect the overall priority of Pacific Northwest power users so that only energy that is surplus to their needs can be transmitted to California. Governor Brown has stated that he also will support such legislation.

As you know, the State of California has employed the consulting firm of H. Zinder & Associates, of Seattle, to make an independent engineering study of a possible electric power interconnection with the Pacific Northwest. The consulting engineers expect to submit a progress report in June and their final report by September 30, 1960.

In the light of this development, Mr. Chairman, I respectfully suggest that it would be appropriate for the committee to request the Secretary of the Interior to take no conclusive action on the proposed transmission intertie until your committee has had an opportunity to review the State of California's report on the independent study now underway.

With kindest regards,
Sincerely yours,

CLAIR ENGLE, *U.S. Senator.*

## SENATOR ENGLE'S JANUARY 25 LETTER TO SENATOR MURRAY

U.S. SENATE,
*Washington, D.C., January 25, 1960.*

Hon. JAMES E. MURRAY,
*Chairman, Interior and Insular Affairs Committee,*
*U.S. Senate, Washington, D.C.*

DEAR MR. CHAIRMAN: I have examined the preliminary draft of the report submitted to you by the Bonneville Power Administration on the subject "Study of a High Voltage Electrical Interconnection Between the Pacific Northwest and California." It certainly is interesting. But I find it difficult to reconcile its conclusions with its findings.

For example, the report finds that an all-Federal interconnection between the Bonneville system in Oregon and the Central Valley system in California—that is, a single 230-kilovolt circuit from Yamsay to Keswick with a capacity of 200,000 kilowatts—would have a benefit-cost ratio of 2 to 1. It finds that a private interconnection of the same voltage and capacity from Klamath Falls to the Pit No. 3 station of the Pacific Gas & Electric Co. (only half the length of the Yamsay-Keswick route) would have a benefit-cost ratio of 2.79 to 1. Assuming the accuracy of the calculation, the difference in my opinion is not enough to justify scrapping the public preference provisions of both the Bonneville and the Central Valley Acts in favor of a private intertie.

Furthermore, why isn't the feasibility comparison made between the proposed Klamath Falls-Pitt No. 3 private line and a Klamath Falls-Keswick public line? This should bring the respective benefit-cost ratios closer together, or perhaps even. After all, that existing line from Yamsay to Klamath Falls which the private intertie would utilize originally was built by Bonneville and later sold to the California-Oregon Power Co. If it is assumed that Copco can wheel surplus Bonneville power from Yamsay to Klamath Falls for delivery to the P.G. & E., for comparative purposes it also can be assumed that Copco can wheel the same power over the same line for delivery to the CVP system.

A number of other questions come to mind as I read the report—such as the conclusion that California cannot rely upon Pacific-Northwest surplus energy for CVP irrigation pumping in midsummer. Why not? This is just the time, as I understand it, when Bonneville's energy output is the highest and its Northwest load the lowest.

In any event, Mr. Chairman, I should like to suggest the advisability of having this report carefully analyzed by a competent professional utility expert, perhaps temporarily retained as a committee consultant. It seems possible to me that this latest report may in fact constitute further justification for the Federal intertie that I first proposed in the 82d Congress.

It is obvious from the preliminary draft that your committee is to be commended for its timely action in the last session when you requested the Secretary of the Interior to make the study before entering into any intertie contract with the private utilities in the area. Thank you for giving me the opportunity to review the draft.

Sincerely yours,

CLAIR ENGLE, *U.S. Senator.*

## SENATOR MURRAY'S REPLY TO FOREGOING LETTER

U.S. SENATE,
COMMITTEE ON INTERIOR AND INSULAR AFFAIRS,
*Washington, D.C., January 26, 1960.*

Hon. CLAIR ENGLE,
*U.S. Senate,*
*Washington, D.C.*

DEAR SENATOR ENGLE: Thank you for your letter of January 25 relating to the Bonneville-California power intertie problem.

Your comments on the preliminary draft of the Bonneville Power Administration's report on the intertie are interesting and informative. It is possible that some of the findings may be modified as a result of comments and conferences on the preliminary draft.

While appearing before the committee today on my conservation bill, Governor Brown, of California, announced he was ordering the employment of a consulting engineering firm to make a study of plans for a "truly adequate extra high voltage transmission interconnection between Bonneville Power and Central Valley systems." He expressed the hope that the other States concerned would join in this study. I understand there was a conference in Portland this week which may result in some modifications of the Bonneville draft.

The time for filing a report by the Secretary of the Interior on the intertie has been extended to February 15. Governor Brown indicated he would ask for a further extension to complete the California review. It is anticipated that Governor Brown will request further delay before the committee acts.

While I appreciate your suggestion that the committee employ a consultant to review the Bonneville report, I am inclined to defer consideration of that proposal until the review Governor Brown mentioned has been made. I assume it will be made available to the committee.

I hope Governor Brown will make a formal request of the committee to defer action on the intertie proposal until the California study is completed. You may desire to supply him or his power consultant the information in your letter of January 25.

I hear you have had a bout with the flu or some such ailment, but I hope you have recovered.

With best wishes,

Sincerely,

JAMES E. MURRAY, *Chairman.*

## PRESS RELEASE OF THE DEPARTMENT OF THE INTERIOR

[For release Mar. 29, 1960. Department of the Interior, Office of the Secretary, Information Service]

### DEPARTMENT URGES ACTION ON OFFER TO BUY SURPLUS BPA POWER

The Department of the Interior today asked the Senate Interior Committee for the committee's position on the offer of Pacific Gas & Electric Co. to purchase about $1,800,000 worth of secondary energy annually from the Bonneville Power Administration. The proposed offer would make the contract subject to cancellation by either party on 30 days notice.

In a letter to Senator James Murray, chairman of the committee, Assistant Secretary Fred G. Aandahl said:

> It is hard to find a reason for not having made the sale. This energy is now being wasted to the ocean in water spilled from Federal reservoirs without generating power because there is no immediate market for such power.

The Department's consideration of the company's offer, made about a year ago, was suspended at the committee's request pending consideration by the committee of the proposal for a high voltage interconnection between the Pacific Northwest and California.

Copies of the Department's study on the intertie proposal were submitted to the committee on February 17, 1960.

Pointing out that the loss of revenue resulting from the waste of unmarketed secondary energy is seriously jeopardizing the continuance of low power rates in the Pacific Northwest, Assistant Secretary Aandahl asked that the Department receive the committee's position prior to the adjournment of Congress. Recently, some Members of Congress were critical of annual deficits in BPA operations.

"This sale can be made on a temporary basis without any Federal transmission line construction and without any implication of a future obligation of any kind," Mr. Aandahl said.

Copies of Assistant Secretary Aandahl's letter and a letter of March 14, 1960, from the Pacific Gas & Electric Co. are attached.

U.S. DEPARTMENT OF THE INTERIOR,
OFFICE OF THE SECRETARY,
*Washington, D.C.*

Hon. JAMES E. MURRAY,
*Chairman, Committee on Interior and Insular Affairs,*
*U.S. Senate, Washington, D.C.*

DEAR SENATOR MURRAY: Attached is a copy of a letter dated March 14, 1960, from the Pacific Gas & Electric Co. The letter calls our attention to the continuation of the company's offer of more than a year's standing to purchase from the Bonneville Power Administration approximately $1,800,000 worth of secondary energy annually. This sale can be made on a temporary basis without any

Federal transmission line construction and without any implication of a future obligation of any kind.

It is hard to find a reason for not having made the sale. This energy is now being wasted to the ocean in water spilled from Federal reservoirs without generating power because there is no immediate market for such power. This loss of revenue is seriously jeopardizing the continuance of our low power rates in the Pacific Northwest.

As you know, our consideration of this matter was suspended pending consideration by your committee of the intertie proposal in accordance with your request of July 13, 1959. We submitted to your committee on February 17 the study of a high-voltage interconnection between the Pacific Northwest and California. Copies of this report had previously been provided the consultation group mentioned in the resolution of your committee of May 19, 1959.

While we are cognizant of the fact that this is a matter which requires thorough study, it is our hope that your committee will be able to advise us as to your wishes as to further committee consideration of this matter. And we respectfully suggest that this is a matter upon which we must have an indication of your committee's position prior to the adjournment of this Congress.

Sincerely yours,

FRED G. AANDAHL,
*Assistant Secretary of the Interior.*

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PACIFIC GAS & ELECTRIC CO.,
*San Francisco, Calif., March 14, 1960.*

Hon. FRED A. SEATON,
*Secretary of the Interior,*
*U.S. Department of the Interior, Washington, D.C.*

DEAR MR. SECRETARY: A year ago, The California-Oregon Power Co. and Pacific Gas & Electric Co. conducted negotiations with Bonneville Power Administration for contracts which would enable Bonneville to sell surplus dump electric energy to Pacific at the California-Oregon border. The energy would be delivered over existing company lines, and a new 230-kilovolt line to be constructed by the companies between Klamath Falls and the pit No. 3 powerhouse of Pacific. Bonneville would receive on the average $1,800,000 a year for the dump energy. I informed the chairman and members of the subcommittee of the Senate Committee on Interior and Insular Affairs by letter dated April 15, 1959, that Pacific would agree to a provision allowing either party to terminate the contract between Bonneville and Pacific on 30 days' notice.

Pursuant to a resolution adopted by the committee on May 19, 1959, further contract negotiations were suspended until a study of the feasibility of other interconnections for the disposal of Bonneville energy in California had been completed. Bonneville, in cooperation with the Bureau of Reclamation and in consultation with interested parties in the Pacific Northwest and California, recently completed such a study, which was submitted by the Department of the Interior to the committee on February 17, 1960. The study shows that the only financially feasible interconnection is the 230-kilovolt line proposed last year, and that this will make possible an annual average

delivery of 860 million kilowatt-hours from Bonneville to California and provide an average annual revenue to Bonneville of $1,800,000.

In view of the conclusion arrived at in the study, it would appear to be in the public interest now to execute a contract providing for delivery of Bonneville suplus dump energy over the presently proposed 230-kilovolt line and avoid any further loss to the Government. Since the contract could be canceled at any time, it would not prevent the construction of any other lines found feasible in the future. In the meantime, the Government would gain $1,800,000 a year in revenues from Bonneville energy now going to waste in the Northwest.

Very truly yours,

ROBERT H. GERDES,
*Executive Vice President.*

## LETTER OF GOVERNOR BROWN RELATING TO STUDY OF HIGH VOLTAGE TRANSMISSION

STATE OF CALIFORNIA,
GOVERNOR'S OFFICE,
*Sacramento, March 23, 1960.*

Hon. JAMES E. MURRAY,
*Chairman, Senate Committee on Interior and Insular Affairs,*
*Senate Office Building, Washington, D.C.*

DEAR SENATOR MURRAY: On February 17, Assistant Secretary of the Interior Aandahl submitted to your committee a report of the Secretary of the Interior entitled "Study of a High Voltage Electrical Interconnection Between the Pacific Northwest and California." This report was an attempt to comply with the instruction of the Senate Committee on Interior and Insular Affairs contained in the resolution of the committee adopted on May 19, 1959.

Prior to the time the May 19 resolution was adopted by the committee, the States of Oregon, Washington, and California considered embarking upon a study to determine the feasibility of a high-voltage electrical interconnection between the Pacific Northwest and California. When the committee's resolution was adopted with its instruction to the Bonneville Power Administration, the States determined to await the outcome of the studies which Bonneville was to conduct. It was considered that, if a comprehensive study and one which took into account all of the important elements of the matter was undertaken and completed, it would be useless for the States to duplicate that activity.

Unfortunately, the Department of the Interior has taken the same narrow perspective in conducting its study as it did a year ago in attempting to justify the proposed contract with the Pacific Gas & Electric Co. which was then being discussed by your committee. We were disappointed particularly with respect to the scope as well as many of the assumptions used in the study. Indeed, the analysis of the report by our technicians seems to indicate that it was merely an attempt to justify the arrangement recommended by the Department of the Interior in the first instance.

The report which was transmitted to you by Assistant Secretary Aandahl was presented to the State and others in draft form for comment early in January. Our observations appear in the appendix at page 2a and following of the final report. I also commented briefly on the draft during my appearance before your committee on January 26 in support of S. 2549. At that time I indicated, that because of the incompleteness of the study conducted by Bonneville, the State of California expected to employ a consulting firm to make a study of

plans for a fully adequate extra high voltage transmission interconnection between California and the Pacific Northwest.

Those arrangements have now been consummated with the firm of H. Zinder and Associates of Seattle, Wash. This is a well-known firm of engineering consultants eminently qualified to perform the kind of study that is merited.

The study is now well underway and will be completed with the cooperation of the States of Oregion and Washington. It is anticipated that at least a preliminary draft of the broader phases and conclusions will be available by the latter part of June. Based upon initial considerations, I am convinced that this study will show the advisability and feasibility of constructing an extra high voltage common carrier intertie with adequate capacity to move large amounts of power throughout the entire Pacific Coast when available. Among other things, the new study may well indicate the feasibility of utilizing the California portion of such a line to transfer power developed at Oroville Dam, the key reservoir in the water development program being undertaken by the State of California. In addition, the Federal Government is considering the best means of transmitting power from the Trinity division of the central valley project. The kind of intertie our engineering consultants will study may provide an answer to this problem. A high capacity common carrier line offers tremendous possibilities to all power agencies—public and private, Federal and non-Federal.

It would indeed be unfortunate if a decision were to be made on this highly important subject without the adequate and detailed study it requires, but has not yet received. I, therefore, respectfully request your assistance and that of the Senate Committee on Interior and Insular Affairs in securing the postponement of any contract which would involve the construction of a Pacific Northwest-California power intertie, as presently contemplated by the Secretary of the Interior, until the studies that are now underway have been completed. It would seem to be extremely unwise to consummate a limited Bonneville Power Administration-Pacific Gas & Electric Co. intertie, as proposed by the Secretary if a comprehensive study of the type which this State has undertaken should justify a much higher capacity common carrier intertie in order to bring about maximum use of the resources of the entire area affected and maximum benefits both to public and private agencies.

Sincerely,

EDMUND G. BROWN, *Governor.*

## RESPONSE OF CHAIRMAN MURRAY TO GOVERNOR BROWN

U.S. SENATE,
COMMITTEE ON INTERIOR AND INSULAR AFFAIRS,
*Washington, D.C., April 18, 1960.*

Hon. EDMUND G. BROWN,
*Governor, State of California, Sacramento, Calif.*

DEAR GOVERNOR BROWN: A reply to your letter of March 23 relating to the "Study of a High Voltage Electrical Inter-Connection Between the Pacific Northwest and California" has been delayed pending consideration by the Committee on Interior and Insular Affairs of the subject. The committee has now set Thursday, May 5, at 10 a.m., room 3110, New Senate Office Building, for a hearing on the subject.

In this connection, you are advised that the committee has received a letter from the Department of the Interior asking for the committee's position on an offer of the Pacific Gas & Electric Co. to purchase approximately $1,800,000 in secondary energy annually from the Bonneville Power Administration. The proposed offer would be under contract with the Pacific Gas & Electric Co. subject to cancellation by either party on 30 days notice.

The committee discussed your letter as well as the proposals from the Department of the Interior which included a letter from the Pacific Gas & Electric Co. dated March 14, 1960. The latter letter confirmed the offer to purchase the secondary energy but there was no disclosure of the method of transmitting the energy to California or the charges therefor.

The committee's position was, in the light of the communications received, that action should be deferred pending further consideration of the communications.

In the meantime, the views of the General Accounting Office and the Federal Power Commission on the report of the Bonneville Power Administration submitted by the Secretary of the Interior on February 17, have been received.

You or your representatives are invited to be present at the hearing on May 5 and make such representations as you feel are justified.

Questions have been raised as to the current proposal which followed the resolution of May 19, 1959, when the committee requested that no contract for the transfer of the Bonneville Power to California be consummated until there was a further study of a proposed high tension intertie between the two areas.

Sincerely,

JAMES E. MURRAY, *Chairman.*

## RESPONSE OF CHAIRMAN MURRAY TO SECRETARY SEATON

U.S. SENATE,
COMMITTEE ON INTERIOR AND INSULAR AFFAIRS,
*Washington, D.C., April 18, 1960.*

Hon. FRED A. SEATON,
*Secretary of the Interior, Department of the Interior,*
*Washington, D.C.*

DEAR MR. SECRETARY: Please refer to the letter of March 20, 1960, from Assistant Secretary Aandahl with respect to a copy he attached of a letter dated March 14, 1960, from the Pacific Gas & Electric Co. The latter called attention to the continuation of the company's offer of more than a year's standing to purchase from the Bonneville Power Administration approximately $1,800,000 worth of secondary or dump energy annually. The communication stated that this sale could be made on a temporary basis without any Federal transmission line construction and without any implication of a future obligation of any kind. The contract would be cancelable on 30 days notice, it was stated.

Mr. Aandahl's letter and the entire subject of the Pacific Northwest-California intertie was discussed at a meeting of the Committee on Interior and Insular Affairs on April 1. It was the consensus of the committee that a public hearing should be held on the proposal of the Pacific Gas & Electric Co., together with its implications and ramifications affecting the Bonneville Power Administration, the Pacific Northwest, and California.

Thursday, May 5 at 10 a.m. in room 3110, New Senate Office Building, has been set as the date for the hearing. Consequently, the committee requests that the consumation of any agreement for the transfer of electric energy from the Bonneville system to California should be held in abeyance until there has been a full disclosure of the various ramifications of the problems involved.

Please advise the names of witnesses who will appear on behalf of the Department.

Sincerely,

JAMES E. MURRAY, *Chairman.*

Copy to Bonneville Power Administration.

## LETTER OF CHAIRMAN MURRAY TO SENATOR ENGLE

U.S. SENATE,
COMMITTEE ON INTERIOR AND INSULAR AFFAIRS,
*Washington, D.C., April 19, 1960.*

Hon. CLAIR ENGLE,
*Senate Office Building, Washington, D.C.*

DEAR SENATOR ENGLE: I have delayed a reply to your letter of March 22, relating to the study of a high voltage electrical interconnection between the Pacific Northwest and California, until various phases of this study could be considered.

At a meeting of the Committee on Interior and Insular Affairs on April 1, a decision was made to hold a hearing on the various phases of the Pacific Northwest and California intertie when all of the factors could be brought out for consideration.

As a result of this decision and at the request of Senator Jackson, a hearing has been called for Thursday, May 5, on all phases of the problem, including the recommendation by the Department of the Interior for the sale of dump power from the Bonneville Power Administration to the Pacific Gas & Electric Co., which would yield approximately $1,800,000 annually. The proposed contract would be cancellable on 30 days' notice, but there are several other factors in connection with the proposed transaction.

Governor Brown has been advised of this hearing, and I am sending a copy of this letter to Mr. James K. Carr, chairman of the California Water Commission at Sacramento.

Sincerely,

JAMES E. MURRAY, *Chairman.*

Copy to Mr. James K. Carr.

## NIGHT LETTER FROM GUS NORWOOD OPPOSING INTERIOR'S PROPOSAL

MARCH 30, 1960.

Senator JAMES E. MURRAY,
*Chairman, Senate Interior and Insular Affairs Committee,*
*Senate Office Building, Washington, D.C.:*

We strongly oppose suggestion of Assistant Secretary Aandahl on private utility monopoly over California intertie. Our detailed recommendations and comments appear at page 26a of the intertie report. We urge the committee to adopt a further resolution urging Interior to await completion of study being made by the three States and opportunity for the committee to review this further study.

Respectfully,

GUS NORWOOD,
*Executive Secretary, Northwest Public Power Association.*

## RESOLUTION ON INTERTIE ADOPTED BY THE INTERIOR COMMITTEE ON MAY 19, 1959

*Resolved,* That the Committee on Interior and Insular Affairs request:

(*a*) That the Secretary of the Interior direct the Bonneville Power Administration to conduct, in cooperation with the Bureau of Reclamation, a study and analysis of the feasibility and desirability of a high-voltage interconnection for disposal of surplus secondary energy between the Federal power systems in the Pacific Northwest and California and report to the Congress thereon, together with conclusions and recommendations not later than July 15, 1959;

(*b*) That this study and analysis include consultation with the Governors of the States of California, Oregon, Washington, Idaho, and Montana, with the Federal Power Commission and representatives designated by the Pacific Northwest power pool, as well as organizations representing public and private utilities in California; and

(*c*) That, among other factors, this study and analysis shall include:

(1) all presently foreseeable power loads and resources, both public and private, in the two regions;

(2) the best interests of all Federal agencies in the two regions, both at present and in the foreseeable future, including increases in the firm power capability of the two systems directly affected;

(3) the national defense aspects of such an interconnection;

(4) the maximum voltage economically feasible for such an interconnection, both initially and ultimately;

(5) the conservation and maximum utilization of both fossil fuel and hydroelectric resources in the two regions;

(6) the effect, if any, that the proposed interconnection would have on the geographical extent of the Bonneville Power Administration service area and the effect, if any, on the rights of preference customers and other customers within the service area to require power from the Bonneville system;

(7) estimates of construction and operation and maintenance costs involved in any interconnection; and

(8) all other financial aspects involved in the several phases outlined in this resolution;

*Be it further resolved,* That the committee request the Secretary of the Interior to suspend all negotiations for any interconnection or sale of surplus power until the Congress has had the opportunity to consider and act on the study and analysis requested by this resolution.



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